



**ANNUAL
REPORT
1986-87**



**Department of Agriculture
New South Wales**

CAB INTERNATIONAL
MYCOLOGICAL INSTITUTE

24 MAY 1988

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New South Wales**



COVER

Seventy-five per cent of water used in NSW is for irrigated agriculture. The Department provides agronomic, horticultural, engineering and economic advice to irrigators to help them use their water more efficiently and profitably. This technology is provided through District Advisory Officers, the Irrigation Management Service and through the Department's involvement in Water Force.

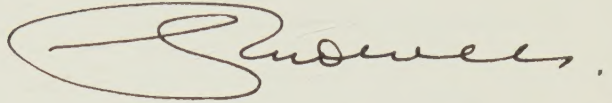
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Division of Agricultural Services

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The Hon. J. R. HALLAM
Minister for Agriculture, Lands
and Forests
Sydney

Sir,

I have the honour to present a report
reviewing the activities of the
Department of Agriculture for the
year ended 30 June 1987.

A handwritten signature in dark ink, appearing to read 'G. H. Knowles', with a large, stylized initial 'G' that loops around the first part of the name.

G. H. KNOWLES
Director-General



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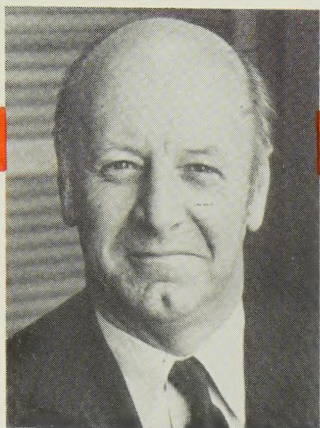
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FOREWORD

by the Director-General for Agriculture Mr G.H. Knowles

RURAL ECONOMY

1986-87 was a year of mixed fortunes for farmers in New South Wales, although the overall outcome was considerably more favourable than in the previous year. The buoyant wool and prime lamb markets and the favourable prices for beef have resulted in a marked improvement in the grazing industries. At the farm level, cash operating surpluses in the grazing, dairy and horticultural industries were almost 30% higher in 1986-87 than in 1985-86.

Nationally, gross value of rural production rose by 8% during the year, largely as a result of the depreciation of the Australian dollar, and the sharply rising prices of non-food agricultural products such as wool and other fibres, principally cotton. Together with the rise in value of rural production, the rural economy saw a record value of rural exports earned, estimated at \$11,700 million.

On the debit side, the situation for the New South Wales wheat and cereal farmer remains severely depressed with the outlook for world wheat prices continuing to be bleak. During the year, the price of wheat fell by 27%, resulting in a further severe decline in average wheat and other crop farm incomes to an estimated minus \$36,000.

With the further fall in the price of wheat relative to other grains and wool, major structural adjustment continues to take place throughout the New South Wales cereal belt. While wheat farming can still be profitable given low levels of indebtedness, there has been a greater emphasis on alternative enterprises, particularly livestock, in the farm enterprise mix.

However, due to the sharp increase in debt on many wheat farms, business debt rose in real terms by nearly 40% between 1977-78

and 1985-86. The viability of alternative enterprises for many wheat farmers requires careful analysis and, generally, high levels of farm management and financial skills are required for success.

FARM BUSINESS MANAGEMENT

Programs have been introduced by the Department of Agriculture to provide farmers with financial and technical information on farm business management.

One of these, the Farm Cheque Program, developed by officers at Goulburn and Young, assists farmers to keep records and use them to assess and compare their financial performance. Farmers in the program can then obtain specific technical advice from Department of Agriculture advisory officers. The program is designed to help farmers find profitable enterprises that they hadn't thought about before. It highlights the fact that the cost of producing a hectare of wheat on one farm can be double what it is on another.

Waterforce is a program of special interest to rice growers and other irrigators where there is a wide variation between top yields and average yields. This program also helps farmers improve their profitability.

Other programs that have proved successful in helping farmers with realistic decision-making exercises are Beef-n-omics and Sheeпо, computer models that demonstrate the profitability of various management options to beef and sheep producers.

A computerised Farm Management Recording System for the poultry industry is credited, along with the Department's Random Sample Layer Test Service, with having contributed significantly to an increase in average egg production of 10 eggs per hen per year. Another computerised recording system, Piggy Bank, allows pig producers to compare efficiency between piggeries and has encouraged producers to transfer to more sophisticated commercial recording schemes. Piggy Bank, in conjunction with the Department's Boar Test Station, has led to significant increases in returns to pig farmers.

EXPORT DEVELOPMENT

The Department increased its export development effort and the Export Development Unit remained in the vanguard of what has now become a nationwide effort to promote the development of a more diverse range of agricultural products for a wider range of international markets.

Major promotions during the year included the organisation of an Australia-wide tour by representatives of three of Europe's major horticulture importing companies, Hunter Produce Ltd, Alrava-France and F. T. K. Ltd Rotterdam. The tour lifted the profile of the New South Wales industry in the European market and was quickly followed by a visit of the giant British retail outlet, Marks and Spencer. In combination with other development initiatives, the success of the tours has given a big boost to our trade in 'new' products, which augurs well for the future.

At the same time that the Department was encouraging traders to New South Wales, its officers were participating in successful trade missions abroad. The Deputy Director-General accompanied a trade mission to Japan organised by the Company Directors Association of Australia and endorsed by the New South Wales Government. The Regional Director of Agriculture for the North Coast Region was part of a State Government Trade Mission to Thailand and made a return visit to follow up contacts made during the mission.

RESEARCH AND DEVELOPMENT

Whilst the Department is paying special attention to the immediate needs of those sections of the rural economy in financial difficulty, it still maintains its wide-ranging research and development programs aimed at the longterm betterment of both the State's rural industries and of its rural environment. The Department has, for example, released 18 new grain varieties in the last five years (wheat, barley, maize, oats and rice). As a result, farmers have been able to maintain yields in the face of changes in disease strains and have had access to higher quality and more marketable varieties.

More recently, and with the assistance of the Reserve Bank, the Department brought Dr Ron Harris to New South Wales to help with its investigation of persistent pesticide residue problems in soils. Dr Harris is a

Principal Research Scientist and Head of Agriculture Canada's Soil Pesticide Section. He is a world authority on pesticide residue management. Dr Harris worked with a team of departmental scientists on a project based on the north coast of New South Wales and was able to show that levels of pesticide residues in north coast soils were low by world standards and were falling faster than had been expected.

Another of the Department's projects that has borne fruit is the controlled breeding of Sydney rock oysters. Departmental research has shown how to successfully rear Sydney rock oysters under controlled conditions; and during the year, work commenced on a \$1.1 million oyster hatchery at the Department's Brackish Water Fish Culture Research Station, Port Stephens. The hatchery will rear small oysters (spat) for sale to oyster farmers. The development of a hatchery will also allow further research into Sydney rock oysters, including a genetic improvement program aimed at providing disease-resistant and faster growing oysters.

Agriculture is, and will remain, an important component of the New South Wales economy. Its high level of efficiency is due largely to the contribution of research and the provision of advisory services to primary producers. Rising production costs and, in many instances, falling commodity prices, coupled with the need to conserve and improve the environment, mean that the adaptability and prosperity of the agricultural sector will continue to depend on agricultural research and development and the dissemination of new knowledge to farmers for application. This, basically, is what the Department of Agriculture is all about.



Stick culture of the Sydney rock oyster. Spatfalls were good this year and production can be expected to increase in two to three years' time.



CHARTER

The Department of Agriculture was initially an offshoot of the Department of Mines. The creation of the Department of Agriculture was, then, an administrative rather than a legislative decision. The fisheries of New South Wales were placed under Ministerial control as 'Chief Secretary's Department—Fisheries Branch' in 1911. The Department of State Fisheries was formed in 1976, then integrated with the Department of Agriculture in 1983. The Fisheries and Oyster Farms Act 1935 sets out the powers and functions of the Minister in relation to fisheries generally.

CORPORATE GOALS

The goals of the Department of Agriculture are to improve the prosperity and quality of life of both the rural and urban communities of New South Wales by:

1. Promoting the efficient sustainable use of the agricultural, livestock and fisheries resources.
2. Protecting and enhancing the environment.

Favourable prices for beef this year have contributed to a marked improvement in the grazing industries.

3. Safeguarding and improving the productivity and profitability of our agricultural, livestock and fishing industries.
4. Encouraging diversification and development of new enterprises within those industries.
5. Developing and maintaining effective liaison with each industry.
6. Fostering the development and management of recreational fishing.
7. Encouraging the marketing of safe, acceptable produce.
8. Assisting in seeking, identifying and developing markets.
9. Ensuring efficient cost-effective use of revenue in attaining these goals.

AIMS AND OBJECTIVES

Arising from the corporate goals are the following objectives:

GENERAL OBJECTIVES

Staffing

1. To maintain an encouraging and concerned attitude towards the welfare of employees, and to encourage their personal development.

Department's clients

2. To provide services to the total community with emphasis on efficient producers to maximise the benefits to New South Wales.





Among departmental activities at the Royal Easter Show was a special assessment competition for school children. At this year's Show, the Minister had the unusual pleasure of sashing a steer led by his daughter on behalf of Griffith High School. Jackie Hallam (right) and her father are shown with the 4th-prize winning animal.

Competing services

3. To provide services that will not compete when satisfactory alternative services are available or can be encouraged to develop.

Style of action

4. To anticipate and seek solutions to production, management and marketing problems.
5. To maintain a modern information system to communicate with the public.

REGIONAL OBJECTIVE

6. To deliver to rural industries, programs and services appropriate to local conditions and needs, and consistent with departmental objectives.

DIVISIONAL OBJECTIVE

7. To design and evaluate programs and services for rural industries and to provide support to regions in the application of programs consistent with departmental objectives.

SERVICES OBJECTIVES

Marketing

8. To improve the matching of producer decisions with market demands.
9. To provide information on the analysis and availability of markets for primary produce.

10. To monitor the economic situation in key rural industries and advise government and industry of trends, and to provide information to encourage the efficient allocation of resources.

Agricultural education

11. To help ensure that there is an appropriate level of skills and knowledge training in agriculture.
12. To improve consumer education about agricultural commodities.

Disaster management

13. To assist producers affected by disasters, and who can be viable in the long term, to remain in production.
14. To encourage efficient resource management during disasters, thereby reducing land degradation and the depletion of essential breeding stock.
15. To encourage self-help by producers to achieve natural disaster preparedness.

Regulation

16. To maintain and develop a prudent set of regulations to promote the longterm efficiency, safety and harmony of the agricultural, livestock and fishing industries.
17. To ensure that relevant government regulations are understood by the community.

INDUSTRY OBJECTIVES

Improvement

18. To assist in relating genotypes and breeding systems to the various New South Wales production and marketing environments.
19. To encourage development of genotypes capable of increased productivity and profitability.
20. To foster the sale and export of demonstrably superior genetic material.
21. To ensure the availability of a diversity of improved and appropriate genetic material.

Protection—pests and diseases

22. To ensure that the means are available to protect plant, livestock and fish industries from pests and diseases.
23. To improve and operate an agricultural and fisheries quarantine and export inspection service.

24. To conduct programs in plant and animal health to minimise the economic effects of diseases and to improve productivity and market quality of animals, plants and fish, and their products.

Animal welfare

25. To protect and enhance the welfare of economic livestock and to protect animals against harmful husbandry and experimental procedures.

Public health

26. To conduct programs to minimise the spread of diseases from animals to the human population.

Environment

27. To provide advice on the use of land to ensure the maintenance of a high quality environment.
28. To protect the environment by encouraging efficient adoption of approved practices in the use of all agricultural and fisheries resources, including recreational fishing.

Production

29. To improve rural productivity by identifying and helping to overcome production constraints.
30. To provide advice on all technical and economic aspects of agricultural, livestock and fisheries production, to enable the most efficient use of resources.

Products

31. To encourage improvement in product quality and in the harvesting, storage and distribution of agriculture and fishery products.

CORPORATE PLANNING

As well as performing a host of ongoing activities, the Department is giving increased emphasis to 11 programs that are described in detail in its publication *Strategic planning in the Department of Agriculture 1986*. The program titles and objectives are listed below. Progress towards achieving the objectives is included under each of the five major sections of the report.

THE AGRICULTURAL REGIONS OF NEW SOUTH WALES



Region 1: NORTH COAST

Headquarters Wollongbar

Region 2: NEW ENGLAND HUNTER AND METROPOLITAN

Headquarters Gunnedah

Region 3: ORANA AND FAR WEST

Headquarters Dubbo

Region 4: CENTRAL WEST, SOUTH EAST AND ILLAWARRA

Headquarters Orange

Region 5: MURRAY AND RIVERINA

Headquarters Yanco

1. Farm resource management

- To provide economic information for use in farming decisions.
- To highlight the significance of adjustment pressures on agriculture and to enhance the Department's capacity to develop policies and programs that reflect these pressures and the options available.
- To promote key decision-making and managerial skills relevant to farm businesses.

2. Pesticide program

- To facilitate an improvement in the use of pesticides and conduct research into new pesticides and their alternatives.

3. Computerised information systems

- To provide computer-based mechanisms for harvesting, storing and processing selected essential technical and regulatory data, and retrieving relevant information.
- To coordinate the development of these systems to ensure approved priorities are observed and that adequate interaction occurs, and to minimise wastage and overlaps between systems.

4. Conservation farming

- To develop and promote techniques that are economically sound and ecologically safe for use in sustainable productive systems.

5. Export development

- To increase rural exports from New South Wales.
- To identify export market opportunities.
- To facilitate export market opportunities.
- To assist producers to meet export market demands.

6. Animal welfare

- To promote the application of animal welfare codes of practice by the livestock industries.
- To ensure conformity to 'animals in research' legislation at all departmental institutions.
- To relate good animal welfare to good livestock production.
- To establish relationships between stress and productivity using stress indicators.

7. Herd health programs

- To increase the efficiency of animal production by reducing disease problems.

- To institute advisory programs promoting disease prevention by management, vaccination and other prophylactic measures.
- To develop or adopt herd health computer programs for use by officers and practitioners.
- To promote enrolment in these management schemes.

8. Land and environment protection

- To protect the agricultural and fishing resources of New South Wales and improve the rural environment.

9. Profitable wool production

- To develop and promote an integrated whole-farm approach to improve the profitability of wool production in New South Wales.

10. Coastal and estuarine fisheries management

- To protect fish stocks by limiting development of commercial fishing.

11. Staff development and training

- To provide appropriate development and training opportunities for staff in regard to departmental procedures, safety, communication skills and technical and scientific expertise.
- To offer direct assistance and counselling to staff at induction, during career development and in both personal and work-related situations of stress.
- To protect the entitlements of staff in regard to the Public Service Act, Anti-discrimination Act and other relevant legislation.

ACCESS

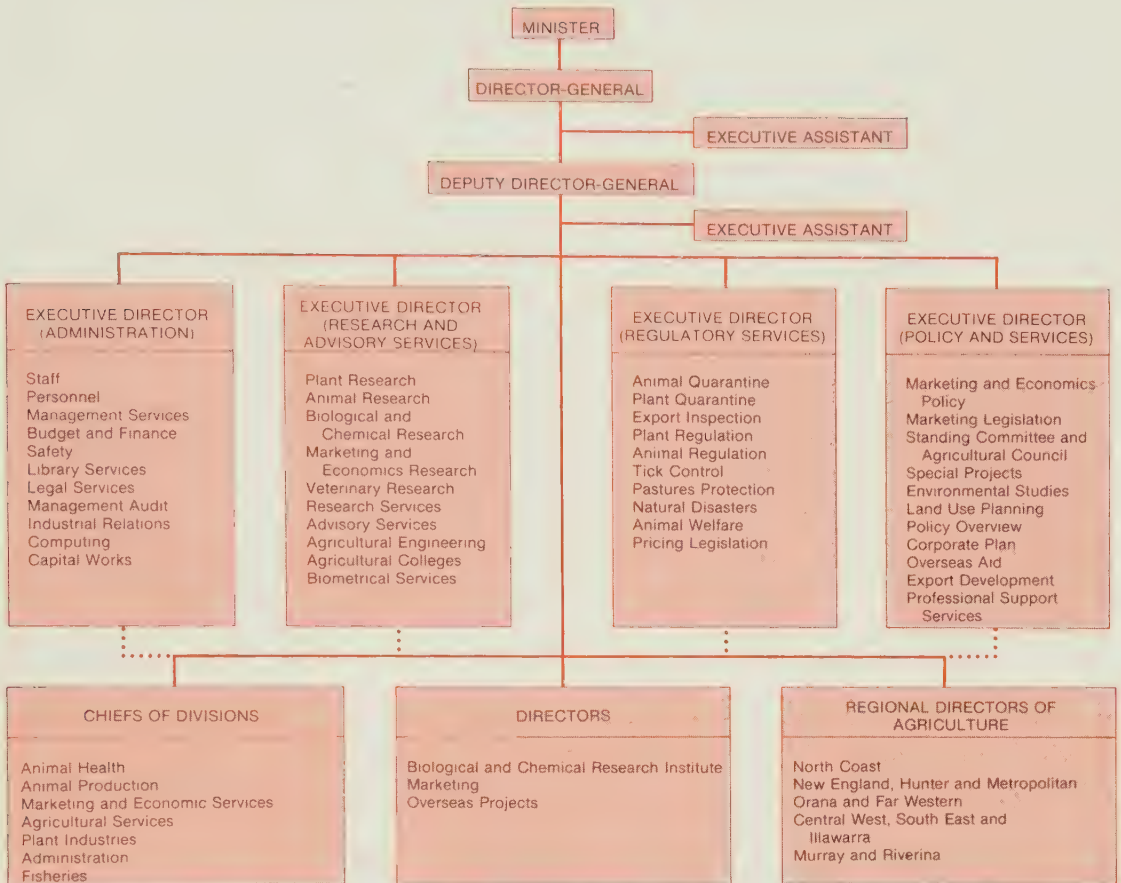
The Department's principal place of business is the McKell Building, Rawson Place, Sydney, telephone 217 6666, telex 72418.

The Department of Agriculture's administration is regionalised, with each of the five regions being managed from its headquarters by a Regional Director of Agriculture, located as follows:

Region 1: North Coast Region

North Coast Agricultural Institute
Wollongbar, NSW 2480
Telephone (066) 24 0200

ORGANISATION STRUCTURE DEPARTMENT OF AGRICULTURE NEW SOUTH WALES



February 1987

Region 2: New England, Hunter and Metropolitan Region
New South Wales Government Offices
35-37 Abbott Street
Gunnedah, NSW 2380
Telephone (067) 42 9200

Region 3: Orana and Far Western Region
New South Wales Government Offices
37 Carrington Avenue
Dubbo, NSW 2830
Telephone (068) 81 1222

Region 4: Central West, South East and Illawarra Region
New South Wales Government Offices
181-187 Anson Street
Orange, NSW 2800
Telephone (063) 63 8245

Region 5: Murray and Riverina Region
Yanco Agricultural Institute
Yanco, NSW 2703
Telephone (069) 53 0211.

Within the regions, and including metropolitan establishments that are outside the regional system, the Department has 146 public offices of one kind or another in 128 separate areas. (The difference between the two figures is explained by the presence of more than one departmental office in some locations.)

HOURS OF BUSINESS

Normal hours of business are 8.30 am to 4.30 pm, Monday to Friday.

MANAGEMENT AND STRUCTURE

GENERAL

Basically, the Department's structure comprises an executive group, production and service divisions, and regions.

The Executive

The Executive is responsible for the overall management of the Department, and for ensuring that government agricultural policy is efficiently implemented.

The line of command is from the Minister through the Director-General, the Deputy Director-General and five Executive Directors. The Executive constitutes a Board of Management, responsible for determining policy. See the organisation chart on page 9.

Divisions

The divisions may be divided into 'production' and 'service' divisions, each headed by a Chief. The production divisions are concerned with agricultural or fisheries technology and the provision of specialised technical services to the producer. They are the Divisions of Animal Health, Animal Production, Fisheries, and Plant Industries. The service divisions, which have a supporting role in departmental activities, include the Divisions of Marketing and Economic Services and Agricultural Services Administration, and the Biological and Chemical Research Institute.

Regions

Each Region is under the control of a Regional Director of Agriculture, a position of equal status to a Chief of Division. The boundaries of the five agricultural regions are shown in the map on p. 7.

PRINCIPAL OFFICERS

At 30 June 1987 the Department's principal officers were:

Minister for Agriculture and Fisheries

The Hon. J. R. Hallam, MLC

Director-General

G. H. Knowles, BSc

Deputy Director-General

G. R. Gregory, BScAgr, RDOen

Executive Director (Administration)

P. J. Small, Personnel Admin Cert

Executive Director (Export Development)
W. Haines, BComm

Executive Director (Policy and Services)
C. Gellatly, BAgEcon, MComm, PhD

Executive Director (Regulatory Services)
B. D. Buffier, BRurSc(Hons), MEcon

Executive Director (Research and Advisory Services)

S. G. Grimmett, BScAgr, MSc, PhD

Executive Assistant to the Director-General
R. J. Jessup, BScAgr

Executive Assistant to the Deputy Director-General

F. S. Benecke, WDA, HDRE

Chief, Division of Agricultural Services
P. A. Witschi, BScAgr

Chief, Division of Animal Health
P. J. Mylrea, MVSc, PhD

Chief, Division of Animal Production
G. C. File, HDA(Hons), BRurSc(Hons), MRurSc

Chief, Division of Fisheries
Vacant

Chief, Division of Marketing and Economic Services
J. Booth, BScAgr, BSc(Hons)

Chief, Division of Plant Industries
Vacant

Chief Administrative Officer
C. J. Cashman, MBA, BComm, BBus
Director of the Biological and Chemical Research Institute
M. Casimir, BScAgr(1st Class Hons)

Director of Marketing
R. D. Wise, MA

Regional Director of Agriculture, Region 1
B. D. Scarsbrick, BA(Sc), 4th yr
AgrSc(Massey, NZ), HDA

Regional Director of Agriculture, Region 2
E. J. Corbin, BScAgr

Regional Director of Agriculture, Region 3
O. R. Southwood, BScAgr

Regional Director of Agriculture, Region 4
D. J. McDonald, MScAgr, PhD(Texas A&M)

Regional Director of Agriculture, Region 5
D. E. Toohey, HDA, Grad Dip Extension

Horticulture

Field crops and pastures

Plant quarantine and export services

Agricultural engineering



CITRUS

Crop improvement

Horticultural assessment and virus indexing of citrus varieties and clones and screening of new rootstocks continue as a major program. New emphasis is being placed on collecting, importing and evaluating both navel and mandarin ('easy peeler') varieties for fresh domestic and export markets.

A cooperative rootstock screening program has been developed at the Biological and Chemical Research Institute, Rydalmere (BCRI), for *P. citrophthora* tolerance; the Horticultural Research and Advisory Station at Gosford, for preliminary field screening; the Agricultural Research and Advisory Station, Dareton, for preliminary salinity screening; and at CSIRO Division of Horticultural Research at Merbein. Over 100 new locally bred and imported rootstocks are currently being evaluated.

This research will lead to the availability of superior budwood or seeds from the Department's budwood and rootstock multiplication schemes. All citrus budwood and seed is now supplied to the industry through the NSW Horticultural Propagation Co-operative Society Limited. Slightly reduced quantities (due to the downturn in citrus processing) were supplied throughout Australia during the year: 483 305 buds and 261 kg of seed. The NSW schemes also supply budwood and seed to other States.

Evaluation and indexing of new citrus clones and varieties in response to the introduction of Plant Variety Rights legislation during the year has highlighted difficulties facing the Government in taking on an evaluative role in private plant propagation schemes. While it is generally agreed that full horticultural evaluation and indexing of new lines is desirable, it is unlikely to be feasible for all privately-owned types.

New South Wales has responsibility for the Fruit Variety Foundation (FVF) Australian citrus planting. Horticultural evaluation and virus re-indexing of 33 FVF clones has now commenced and budwood will be available in the near future for any State to establish bud multiplication units. With 22 new varieties released from plant quarantine and the shoot

tip grafting of 24 older varieties it is expected that the number of varieties in FVF will increase significantly.

Crop protection

Following the downturn in processing demand and prices there is a need to improve fresh fruit quality. Although major pest and disease problems continue at low levels, some—such as scales, sooty mould, rust mites, spined citrus bug and light brown apple moth—did reduce fruit quality.

The major pest red scale remains under control. Research at BCRI has enabled significant progress to be made in understanding the ecology and natural control of white and Chinese wax scales. A parasitic wasp (*Goetheana parvipennis* (Gahan)), introduced from California in 1986 for the control of black thrips, will be released by next year. The Department has reciprocated by introducing a black thrips parasite (*Thripobius semiluteus* (Boucek)) to California.

Following successful research into more rapid detection of citrus exocortis viroid (CEV) by a molecular biological (cDNA-CEV probe) technique, the newly developed procedure has been used for the first time in 1987 to index large numbers of mother trees in the budwood scheme. These techniques are being applied to other aspects of citrus indexing and offer future benefits in providing healthy virus-free material to the industry.

A new shoot tip grafting program also offers the best technique of obtaining virus-free, true-to-type, mature citrus trees for many important commercial varieties that are currently infected.

Production services

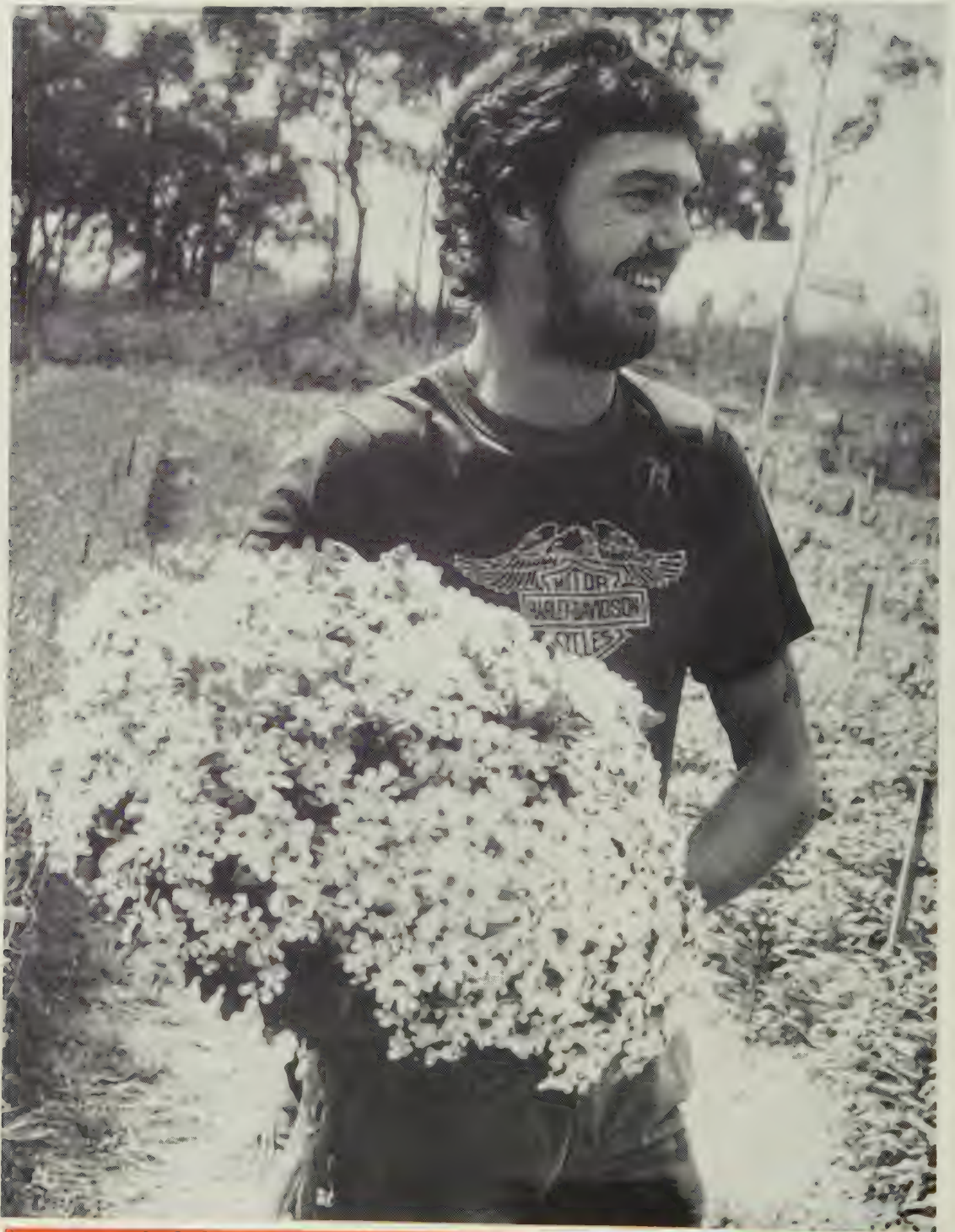
Changed marketing demands mean that citrus will be grown in future for more specialised markets—fresh or processing. Current advisory programs, apart from reducing costs of production and making more efficient use of resources, are now also aimed at improving fruit size and quality of fruit for fresh markets and at increasing the total soluble solids (TSS) yield per hectare and per tonne, as well as improving the average TSS:acid ratios of orange juice.



Above: The recently-opened Temple Kiely Visitors' Centre at the Horticultural Research and Advisory Station, Gosford. Construction of this building was one of several CEP projects undertaken by the Department.

Right: The Minister, Jack Hallam, examines a leaf for the presence of twospotted mite at a display to mark the opening of the Horticultural Research and Advisory Station, Gosford. Looking on are the Premier, Barrie Unsworth, and the State member for Murrumbidgee, Tony Doyle. Research on the mite will help control a major pest of ornamentals and strawberries.





A freshly-cut bunch of candytuft—but too often, poor handling and storage cause flowers to lose condition before reaching customers. A departmental program advises growers, agents and retailers on correct handling and storage practices that will avoid post-harvest losses to the industry.

Fresh citrus exports, mainly from the Murrumbidgee Irrigation Areas (MIA) and the Lower Murray, increased significantly to New Zealand, Malaysia and Singapore during the year. For the first time, the MIA exported fresh citrus to Japan. Exports to these and new markets will increase with new departmental programs on producing and handling quality fruit.

Nutrition has a significant effect on fruit quality. A project at Dareton has emphasised the importance of the correct balance of nitrogen and phosphorus in producing high quality fruit. As nitrogen applications increased, fruit quality deteriorated, showing a decreased TSS:acid ratio and decreased TSS per tonne. High nitrogen and nil phosphorus produced extremely poor fruit whereas applications of phosphorus improved fruit quality.

Postharvest. With the trend towards increasing fresh domestic and export markets, a new postharvest research program has been started to improve fruit quality and develop alternative quarantine disinfestation treatments.

Shrinkwrap. Individual wrapping of lemons in plastic film has been shown to reduce weight loss when fruit is stored under ambient or 10°C temperatures. These treatments can produce good quality lemons and have potential as a cheap method of storing surplus, low-value, main winter crop lemons until December, when prices are high.

Disinfestation. Current exports of oranges to the new Japanese market are fumigated with ethylene dibromide (EDB) against fruit fly. Alternative methods are now required and significant progress has been made in disinfesting oranges by cold sterilisation. Similar work with lemons and Ellendale tangors is continuing.

Further research is being carried out to reduce the risk of chilling injury. This involves surveys of cold-treated oranges grown in different regions; investigation of a possible link with changes in levels of an enzyme associated with ethylene production; investigation of the effect of latent infections of fungi; and the use of shrinkwrapping to reduce susceptibility to damage at low temperatures.

ORNAMENTAL CROPS

The value of nursery production in NSW in 1986 was \$87 million.

The number of commercial nurseries registered under the Horticultural Stock and Nurseries Act remains steady at about 3500 nursery operators and 3300 resellers.

More than \$78,000 collected under the Horticultural Stock and Nurseries Act was disbursed for approved research projects at Universities and the Departments of Agriculture.

Overproduction of easy-to-grow plants, particularly those used indoors, continues and many nurseries are in financial difficulty.

The big increase in the number of flower growers in the last two years has led to overproduction of basic lines such as carnations and chrysanthemums. It has also placed increasing strain on available advisory services.

Crop improvement

At the Horticultural Research and Advisory Station, Gosford, research continues on Geraldton wax (*Chamelaucium uncinatum*), which has the potential to become a major cut-flower export. Techniques for rapid propagation, extension of flowering season and improved postharvest treatments are being investigated.

Suitable production techniques are being developed for a number of Australian rainforest plants. Several plants were identified in a screening program as being better able than many species currently in use to withstand the low light/low humidity conditions encountered indoors. Indoor plants account for almost 25% of the total value of nursery sales in NSW.

Protection services

Several new pesticides are being screened at Gosford for efficacy and phytotoxicity in continuing work on control of twospotted mite (*Tetranychus urticae*), which still causes nursery operators and cut-flower growers considerable difficulty.

Research on another serious mite pest, cyclamen mite (*Steneotarsonemus pallidus*) was also undertaken and suitable control programs are being developed.

Another project extended previous research on suitable pre-emergent herbicides for use on potted plants. Results are promising for a herbicide that will reduce the labour-intensive task of hand-weeding.

Production services

Research projects at Gosford have established the optimum conditions for germination of kentia palm (*Howea forsterana*) seed and identified improved fertiliser programs. This work will greatly increase production efficiency in this very valuable export industry.

Postharvest services

About 100 flower growers attended a seminar conducted by advisory officers as part of the Department's program to improve cut-flower quality. Optimum time for harvest and improved postharvest handling methods for a range of species were discussed and demonstrated.

A poster 'Postharvest Temperature Control for Cut Flowers', produced in cooperation with Interflora, has been distributed to flower growers. Increased competition in this industry is encouraging the adoption of improved techniques by both growers and florists.

GARDEN ADVISORY SERVICE

The Garden Advisory Service answered about 21 000 inquiries in 1986–87, including 18 000 telephone calls, 2500 from visitors and 500 letters.

The service was again represented on a panel of experts giving advice to the public during the Royal Botanic Gardens annual 'Spring in the Gardens' function.

As in 1986, officers gave demonstrations and answered questions from the public at the Royal Easter Show.

POME FRUITS

Crop improvement and production

The third harvest of a Department of Agriculture trial which compares the productivity of apple trees propagated from material infected with latent virus diseases and those from virus indexed material has supported preliminary results and confirms the considerable benefits of using virus-indexed material.

In the 1987 harvest, virus-indexed Jonathan and Delicious yielded 46% and 43% more fruit respectively than infected trees. Data on 1987 yields of a third variety, Granny Smith, are not yet available. But in 1985 and 1986, yields from virus-indexed Granny Smith were appreciably higher than from infected material.

The trial confirms the value of the NSW Pome Fruits Improvement Scheme conducted by the Department and will enhance its acceptance by industry. This Scheme makes high-quality propagation material available to the industry through the Horticultural Propagation Co-operative Society. In the long term the scheme will raise productivity and improve grower efficiency.

The Department has identified a number of apparently superior apple clones in commercial orchards. Performance of these is being monitored and budwood from the clones propagated to assess stability of the selections. Some of this material has been nominated to undergo thermotherapy at BCRI to obtain virus-indexed material that will later form the basis of the relevant budwood scheme.

At the request of the Australian Apple & Pear Industry Research Foundation, the Department undertook a national review of research on pome fruit planting material in 1986. Several recommendations were made, resulting in a national seminar to be held in July 1987. The seminar should provide future direction, nationally, for pome fruit research.

Computer programs are being used by several district horticulturists to identify preferred management options for establishment and management of pome fruit orchards. An establishment model developed for nashi fruit orchards can be used to show projected profitability of an individual enterprise for a particular set of assumptions on the cost of inputs. Growers of nashi and investors in the industry are being encouraged to use this expertise. With the help of district horticulturists, they may substitute values that relate to their own enterprise for those used in the departmental model to gain an estimate of their own likely profitability. Models for apple and European pear establishment and production are also being developed.

The Department continued to assist growers in the adoption of new technology in all aspects of production and marketing, including variety and rootstock selection, planting densities, tree training and pruning, irrigation, nutrition, disease and pest control, pre- and post-harvest handling, packaging and marketing.

The annual *Deciduous Fruits Spray Calendar for Tablelands, Slopes and Coastal Highlands*, issued by the Department, is a

cost effective and much used service which assists growers in management of insects and diseases in their crops.

Three seminars were conducted by this Department and the Department of Decentralisation to advise likely growers of the potential for nashi fruit on domestic and export markets.

POSTHARVEST SERVICES

Spoilage of produce after harvesting is a major source of loss to producers of horticultural crops and is exacerbated by consequent consumer dissatisfaction with poor quality, highly priced produce.

The aim of the Department's postharvest program is to solve problems in storing, handling and marketing of horticultural produce and to develop better technology to maintain fruit and vegetable quality and prevent wastage.

Current major projects include: quality in tomatoes, physiological disorders in apples, storage of bananas at ambient temperature, curing of potatoes, maturity of kiwifruit, removal of ethylene from storage areas, cooling of mushrooms and other produce, temperature stress of plants, ripening patterns of horticultural produce, biological control of postharvest decay, behaviour of new fungicides, studies in control of decay in vegetables, potato greening, disinfestation of fresh fruit by exposure to cold temperatures and irradiation.

Much of this work is conducted in cooperation with the CSIRO Division of Food Research, and is funded from national sources.

Clients for advisory work in postharvest technology include packers, handlers, distributors, transporters, agents, merchants, exporters, providers, retailers and consumers.

The main objective of the Postharvest Advisory Program is to introduce new technology to the marketing chain and so upgrade the quality of produce sold to the consumer. Improved storage life will also assist in development of export markets.

Although growers have shown considerable interest in the export potential of their products over the past year, they have had little or no experience in preparing produce that meets the standard of quality required for export.

The Government's present policy initiative in encouraging export marketing in

horticultural products has suggested a target of \$100 million in exports by 1990. To achieve this objective, considerable resources in postharvest research, advisory and regulatory programs are being directed at informing growers and others in the industry of the correct postharvest management and preparation of produce for specific export markets.

STONE AND BERRY FRUITS

The most recent Fruit Tree Census completed by the Department indicates that the total area occupied by stone fruit crops increased by 65 ha and berry fruits by 70 ha during the year. The Department of Agriculture pursued vigorous research, advisory and regulatory programs in support of this healthy industry.

Crop improvement

The Department's stone and berry fruit program is directed mainly at development of improved fruit types for the domestic and export markets.

The Department supplied growers with virus-tested rootstocks, grafting scions, buds and cuttings of a range of stone fruit types grown at the Agricultural Research Station, Bathurst, through the NSW Horticultural Propagation Co-operative Society Ltd.

Virus indexing of plum rootstocks continued. New plantings established to replace infected ones will be in commercial production in 1988 when it will be possible to fill all orders for cuttings. Virus-tested stone fruit variety planting material is still being obtained by NSW nursery operators under agreement with the Victorian Department of Agriculture and Rural Affairs from the virus-tested plantings at Knoxfield Horticultural Research Institute in Victoria, until the Knoxfield unit is phased out. A reciprocal arrangement exists for citrus budwood from the NSW Citrus Improvement Scheme.

A Strawberry Runner Certification Scheme is conducted by the Department and growers produced about 2 million certified runners for sale in NSW and Queensland this year. A Strawberry Variety Improvement Program is also conducted at the Gosford Horticultural Research and Advisory Station.

During 1986-87, 36 new varieties of peach, nectarine and plum were released from the Plant Quarantine Station at Rydalmere. These were mainly low-chilling

varieties from the University of Florida, which are adapted to subtropical areas where stone fruits have not been traditionally grown. Several of these selections have now been released as named varieties in NSW following testing at the Tropical Fruit Research Station, Alstonville, the Gosford Horticultural Research and Advisory Station, and district locations.

A large-scale stone-fruit variety evaluation program is also continuing at Bathurst Agricultural Research Station and Orange Agricultural Research and Veterinary Centre, where a wide range of introduced and local varieties of peach, nectarine, apricot, plum and cherry is being tested for local and export market potential. Variety evaluation programs are also conducted at Bathurst and Gosford for several miscellaneous and berry fruits.

Production services

Advisory activities in stone and berry fruits have also concentrated on varietal improvement.

As a result of increasing costs of production and high interest rates, a number of district horticulturists prepared economic data to assist growers in decision making, and several publications were issued.

A new maturity test for kiwifruit developed by the Department at the CSIRO Division of Food Research laboratories at North Ryde was presented at the Annual Conference of the Australian Kiwifruit Growers' Association. The test, if adopted, will enable fruit maturity to be determined more precisely and will result in earlier commencement of harvest in many locations.

Five years of research culminated in the 1986–87 season in the provision to orchardists of a disease management service aimed at reducing the impact of the potentially debilitating disease, prune rust. The prune rust service is available to growers through the Pest Check phone-in disease system, and through the media. It was established in the MIA and uses orchard-based microcomputers or prune rust infection predictors (PRIPs) to measure and analyse the weather conditions that influence rust outbreaks.

Data from the PRIPs are examined regularly by departmental advisory officers and warnings of rust infection conveyed to prune growers by radio, television and an automatic answer-phone service. The latter

gives farmers immediate access to information on prune rust infection.

Land suitability study for cherry production

A soil survey of the Young area was undertaken by soil scientists from BCRI in preparation for a land suitability study. This was prompted by concern that a new Rural Environment Plan would allow urban expansion into areas used for cherry growing.

The study combined soils data with other environmental factors affecting cherry production. Using a new three-class system developed specifically for the Young district, the land in the study area was classified and mapped at the detailed scale of 1:25 000.

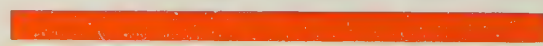
TROPICAL FRUITS

Bananas

Bananas continue to be the major tropical fruit crop grown in NSW. About 6700 ha produce about 65 000 t of bananas annually, for which the wholesale value is \$50 million. In recent years Queensland production has equalled or slightly exceeded that from NSW. However, as a result of cyclonic destruction in Queensland, NSW produced most of the national crop in 1986–87.

Advisory programs concentrated on improving the quality of NSW bananas through improved blemish and temperature control. Videos and wall charts were used to inform growers of correct handling practices, and numerous field days conducted. Market inspectors monitored consignments and downgraded inferior lines.

Soil erosion control was also emphasised, with growers being advised on improved land preparation techniques, road construction and cover cropping. Trials continued at the Alstonville Tropical Fruit Research Station to evaluate cover crop species and assess their value in banana plantations. Preliminary results indicate that while cover crops reduce erosion they also reduce banana growth in the first year. Erosion control demonstration plots were established on several plantations in each north coast district.



Research Horticulturist Vong Nguyen works on a tomato variety trial at the Gosford Horticultural Research and Advisory Station. The Department's tomato improvement program is aimed at breeding more flavoursome tomatoes.



Integrated pest control. Research and advisory programs were aimed at reduced and more strategic use of pesticides. Field trials tested the effectiveness of baits consisting of spent banana pseudostems combined with parasitic nematodes in destroying banana weevil borer, without the use of pesticides.

Growers acted on advice from district horticulturists that banana red spider could usually be adequately controlled by natural predators, with good results.

Macadamias

With over 3000 ha presently grown in NSW, macadamias are expected to produce a crop worth \$30 million in 1990. Approximately 80% of this will be exported, mainly to Europe, America, Japan and South East Asia.

Departmental research continued into improving the yield of high-density plantings, irrigation and the evaluation of new varieties—especially those of upright growth and suitable for close planting.

Advisory staff serviced grower demands for information on cultural problems. Particular emphasis was placed on the need to maintain high levels of soil organic matter to control macadamia decline syndrome, which the industry regards as possibly its main problem. The Department promoted the concept of undertree mulching using grass cuttings in the inter-row spaces. Undertree planting of legume species will also supply organic matter and reduce erosion.

Other crops

Helped by their increasing age and by suitably cold, dry winter weather, lychee plantings produced their heaviest crop yet. Unfortunately the marketing of poor quality fruit reduced prices almost to uneconomic levels. The Department imported new high-quality varieties and continued with research to improve regular heavy cropping.

Investigations continued into problems of splitting and internal browning of custard apple fruit.

Custard apples, lychees and avocados have good potential for export. The Department encouraged and assisted industry endeavours to realise this potential.

VEGETABLES

Vegetable exports

Interest in exporting is increasing among vegetable farmers, broad area crop farmers

and others involved in the vegetable industry. The Department of Agriculture conducted seminars throughout the State to meet the consequent need for information on the special requirements of the export industry, including the need for quality produce, packaging and transport arrangements. Sunraysia growers exported over 2000 trays of rockmelons to Hong Kong and Singapore as part of a joint initiative organised by Victorian and NSW Department of Agriculture officers. In a similar project, over 800 t of onions was exported from Jerilderie to Northern Europe.

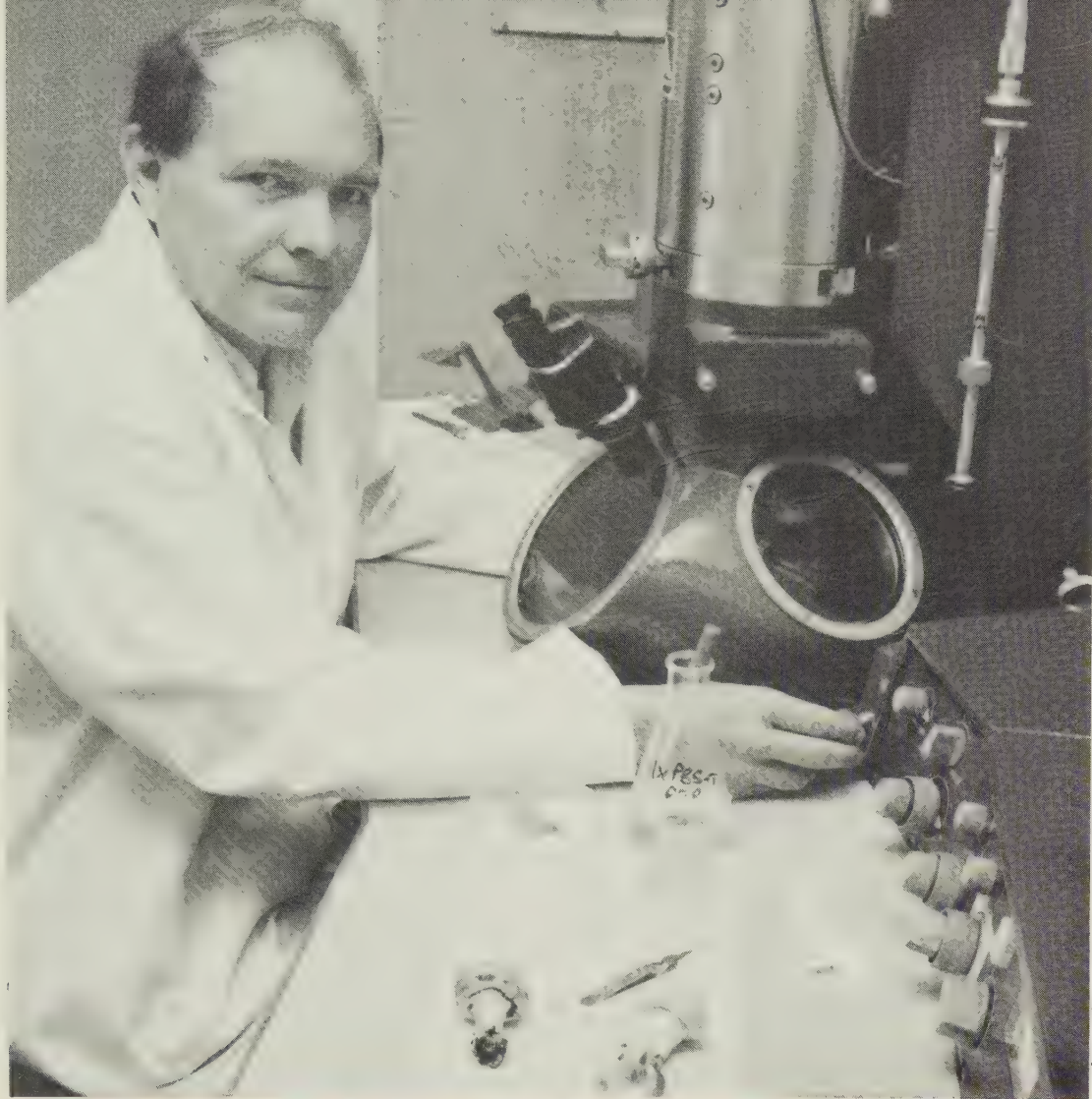
A research horticulturist was appointed to the Gosford Horticultural Research Station to work on problems associated with vegetable exports.

Minimum tillage

Soil stabilisation treatments based on stubble retention and the use of windbreaks were used successfully by potato growers in sandhill areas around Finley. Vegetable farmers in the Riverina and at Trangie reduced cultivations on self-mulching soils by retaining raised growing beds for a second or further crop. A minimum tillage demonstration on intensively cropped vegetable soil in the Hawkesbury Valley showed the benefits of breaking up ploughpan layers and improving soil structure by introducing crops with residues high in organic matter into the rotation. Six crops in three years have now been grown in the minimum tillage trial at the Gosford Horticultural Research Station. Yields from cucumbers, tomatoes, lettuce, broccoli and rockmelons were comparable whether grown under minimum tillage or conventional cultivation, but plastic mulched treatments produced earlier harvests and significantly higher yields.

Vegetable variety evaluation

Varieties of sweet corn, brussels sprouts, leek, small cabbage and Witloof chicory were trialled at Gosford, and melons were trialled at Griffith. Standard and extended-sugar varieties of sweet corn were evaluated by food technologists and commercial processors for their suitability to the fresh market and to processing. The value of hybrid carrots has been recognised by producers with varieties tested in previous departmental trials now being widely grown.



Lowan Turton

Visiting English virologist Dick Barton at the Biological and Chemical Research Institute's electron microscope during his three-month survey of the incidence of virus disease in the Australian mushroom industry. His visit was funded by the Mushroom Growers Association, who were concerned to identify the cause of persistent quality problems in mushroom crops.

Replacement for the herbicide Alachlor

The withdrawal of Alachlor® in mid-1986 created difficulties, especially for growers of sweet corn and brassica crops. Trials in the major brassica-growing area are evaluating alternative materials.

POTATOES

Seed certification

The area for production of certified seed increased to 183 ha, of which 80% is planted to the cultivar Sebago. Indications are that 6000 t of certified seed produced under the new scheme will be produced in 1990,

compared with 800 t from the previous scheme in 1983. Under the Department's new scheme for potato seed, certified seed of pathogen-tested origin will be available commercially for the first time in 1988. Processors have already requested 500 t of pathogen-tested material.

Potato cyst nematode

For a report on quarantine action on potato cyst nematode, see the section Plant Quarantine and Export Services. As a precaution, NSW crops in the main production areas were surveyed, but there has been no evidence of the pest to date.

TOMATOES

Following successful departmental trials at Yanco, there was a significant increase in the use of trickle irrigation for the production of processing tomatoes.

Postharvest evaluation of existing cultivars and breeding lines continued in a joint Department of Agriculture/CSIRO project. A tasting panel confirmed that the flavour of all cultivars was greatly improved when fruit were fully ripened before consumption. Partly ripe fruit of widely grown cultivars such as Flora-Dade rated particularly badly in taste tests, even when it had been chemically treated to enhance ripening.

MUSHROOMS

Mushroom quality has been downgraded by discoloration of the cap, resulting in an off-white appearance. This condition could be reducing market prices by an estimated \$1.00 per kg. Surveys of growers and growing methods have failed to identify the cause of the problem. Virus screening of farms and spawn production units by Dr R. Barton, a visiting mushroom virologist from the Glasshouse Crops Research Institute, UK, showed generally low levels of virus which had no connection with the quality problem.

Conquer®, a biological agent for controlling serious bacterial diseases of mushrooms, was released commercially in September 1986 and is now used by most Australian growers. It is active against diseases which cause an estimated 5% loss in world mushroom production. Conquer was discovered through research at BCRI, Rydalmere. The Department entered an agreement with Burns Philp Food Division to develop and market Conquer worldwide, and has taken out a joint patent with the company.

Crop production in hydroponics

The number of soilless production systems continued to increase, especially on the far north coast. A workshop was held at BCRI to update the expertise of departmental officers in such systems. An industry seminar and evening meetings were well supported and there are good prospects that a hydroponic growers association will be formed in the near future.

VITICULTURE

Crop improvement

The MIA Vine Improvement Society (MIAVIS) sold 936 000 grapevine cuttings to the industry during its third full year of operation. Of these, 717 000 were from varieties for which the NSW Horticultural Propagation Cooperative Society Ltd is the approved source under the Horticultural Stock and Nurseries Act, and for whom MIAVIS acts as agent. From funds generated from MIAVIS sales, vineyard and computer equipment valued at \$4000 was purchased to assist with the Grape Variety Improvement Program at the Horticultural Research and Advisory Station, Griffith.

The Sunraysia (NSW) Vine Improvement Society became a corporate member of the Victorian and Murray Valley Vine Improvement Association, and helped supply 216 000 cuttings from selected plantings in NSW, principally dried vine-fruit varieties. The inclusion of 86 000 table grape cuttings in this quantity reflects the surge in commitment of the table grape industry to higher quality varieties and export marketing. The Department is an active participant in this society.

Production services

A trial to maximise grape production at Griffith, in which vines were trained to a range of canopy densities, was continued. At the first harvest, vines with densest canopies (10 pairs of arms per vine) yielded up to 77 t/ha. Given optimum agronomic conditions—appropriate rootstocks, good soil preparation, and irrigation treatment from the start of the trial—the object of achieving yields of 100 t/ha is close to being achieved.

In an effort to find a replacement for sodium arsenite, which can only be applied before budburst, a trial at Griffith compared several fungicides as spring treatments for dead arm disease in grapevines. The alternative fungicides, which are already registered for other uses in grapevines, all reduced stem infection, leaf infection and leaf fall. They are especially important in giving wider flexibility to the MIA spray program and in controlling the dead arm disease identified recently in Hunter Valley vineyards.

In response to the development of nematode problems in vineyard replant land in the MIA, demonstration plots were established at various locations using resistant rootstocks grafted with five key winegrape varieties. These will serve to promote grower awareness of the problem and show that improved yields can be expected from vines on resistant rootstocks compared with nematode-infested vines on their own roots. The program also included surveys of nutrient status and fertiliser requirements in NSW Sunraysia grapevines and of the extent of grower interest in improved soil management systems.

The use of cover crops in MIA vineyards has been promoted as a method of improving soil structure where water penetration is a problem. To determine the net benefit of cover cropping in terms of water usage, soil water was measured from February 1986 in a commercial vineyard with a white clover cover crop and the results compared with the second treatment, a vineyard under rotary tillage management. In a third treatment, the

cover crop was covered with aluminium-coated black plastic as a means of evaluating water use by the clover sward. Soil moisture was measured by neutron probe to a 1.1 m depth.

It was concluded that where normal cultivated vineyards are irrigated every 21 days, sod cultured vines need irrigating every 14 days. Further measurements during 1986–87 showed that the cover crop used 101 mm of water and the vines 362 mm during the growing season.

In a trial at Dareton to establish optimum irrigation applications and frequencies for own-rooted and grafted Sultana grapevines, irrigation was introduced during 1985–86. The effect of irrigation on yield and growth was slight but the most frequent irrigations (weekly) gave the lowest yields, while the moderate application rate was better than both low and high rates of water application. Results from studies on the amount of water used by vines showed a close relationship to published results from other work.

FIELD CROPS AND PASTURES

AGRICULTURAL ENGINEERING

Tractor campaign

Tractor field days were held in the central west of NSW as part of a major advisory campaign to increase farmer awareness of ways to save on tractor fuel. Tractor reliability, ballasting, wheelslip, working speed, engine operation, depth control, working at light loads and maintenance were discussed at each field day. Talks on engine loading, effect of depth control, how to check wheelslip, and fuel savings at light loads were accompanied by demonstrations. Fuel savings of 15 to 20% were invariably achieved in on-the-spot demonstrations with farmers' tractors. The program was supported by media releases, video presentations and a regular newsletter to farmers.

Conservation farming

Departmental engineering staff continued with work on conservation farming technology, including development of designs for trashflow and seeder ground tools. A highlight of the program for irrigation country was assistance given in development of permanent-bed farming equipment. The fuel

required by one collaborator producing sunflowers on permanent beds was just 18% of that needed when the equivalent crop was produced using traditional tillage practices.

Automatic depth controller

The fuel-saving potential of an automatic depth controller for tillage implements was evaluated at Balranald. Only small savings in fuel were attributed to the controller when tested on chisel ploughs and cultivators, but tractor operation using the controller was much simpler compared with manual control.

Tractor operating and performance simulator

A computer software program was developed that uses mathematical models to simulate tractor and equipment operation and performance. This project was supported in the latter part of the year by Rural Credits Development Funds. The simulator program will be made available as a commercial package for use by farmers, and will also help mechanisation advisers in selection, matching and operation of tractors and allied equipment.

Implement drawbar forces

Trailed tillage implements and landforming equipment can put heavy (and sometimes excessive) vertical loads on tractor drawbars. This makes correct tractor ballasting difficult, and reduces ride comfort, fuel economy and transmission reliability. Engineering staff monitored these forces and consequent failures of tractors at Yanco and on commercial farms, and advised on ways of reducing the risk of failure. A scraper 'dolly' or forecarriage was designed and built at the Agricultural Engineering Centre, Glenfield, and is used for training purposes.

Tractor hopping

With the increased use of mechanical front-wheel-drive tractors (there are an estimated 1000 units in NSW), the phenomenon of tractor 'hopping' has emerged as a new trouble area. This seems to be related to specific soil and implement conditions and is not restricted to any one brand of tractor. It causes extreme discomfort and possibly long-term back injury to operators, and reduces machine life. Careful attention to ballasting, tyre type and pressure and hitching was shown to alleviate the problem, but further work is required.

Disposal of digested sewage sludge

The Sydney Metropolitan Water Sewerage & Drainage Board is investigating disposal of digested sewage sludge from inland sewage works by subsurface injection into farmland. The method also has potential in agriculture for the disposal of animal slurries (as it reduces odours and the risk of environmental pollution), and for the treatment of acidic and sodic soils with slurries of lime and gypsum. The Agricultural Engineering Branch assisted with the design and commissioning of an injection machine which the Board is purchasing to test the health aspects of subsurface application of sewage sludge. The machine is essentially a 21 tonne agricultural vehicle, comprising a pressure/vacuum tank and a chisel plough mounted on an articulated dump truck chassis.

Workshop

The Agricultural Engineering Centre workshop designed and produced the following equipment during the year: a forecarriage (dolly) for relieving the vertical loads on overloaded tractor drawbars; plot and demonstration seeders and seeder

components; a vandal-proof pig handling and movement record receiver; soil sampling equipment; insect detection screens for collaborative work with grain handling and marketing professionals; an instrument to test apples for firmness; diesel engine dynamometers to assess tractor vibration and overfuelling with LP gas; forklift modifications and a fork attachment for bale handling; drawbar-integrated dynamometer and a three point linkage two tine (chisel) dynamometer; fire-fighting outfits (trailer and truck-mounted); hay feeding trailer; share-wear testing rigs; and prickle chain harrows.

Engineering design services

Several pig and poultry producers were assisted in design of equipment to control air intake and movement in controlled-environment structures. Within the Department, extensive engineering design and contract management services were provided for cold storage of apples; seed storage; trout hatchery aquaria; and greenhouses.

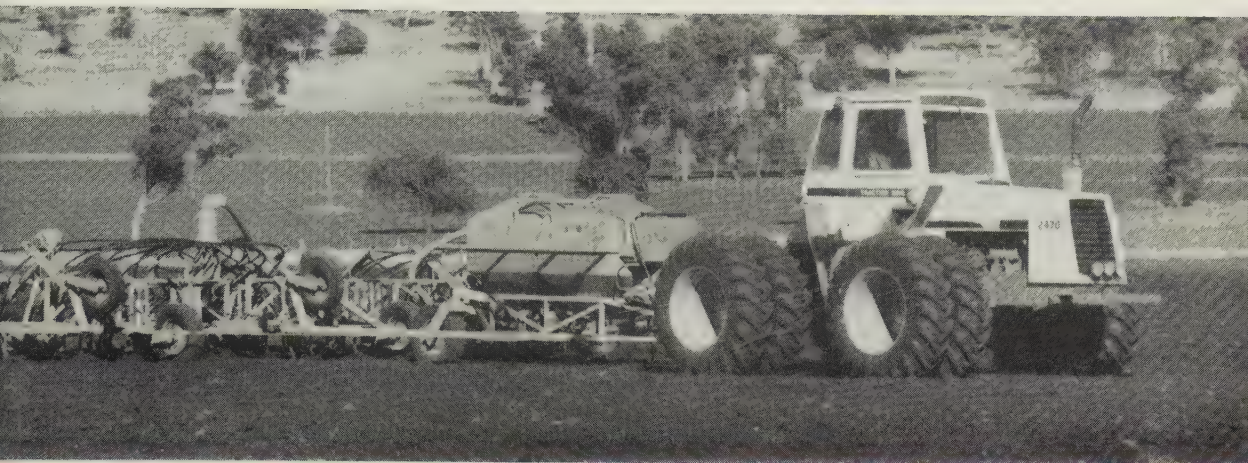
Farm equipment industry assistance

Independent advice on design and development was provided to firms that produce chisel ploughs, offset discs, and a whole-plant cotton uprooter. The uprooter enables beds to be retained, reducing the amount of cultivation and landforming required. Apart from such direct involvement, the Engineering Branch has two staff members on the NSW Agricultural Equipment Advisory Committee which helps resolve differences between farmers and industry arising from complex machinery problems. In 1986-87, the committee heard 17 cases. Many more issues were resolved informally by the complaint-reporting system.

CONSERVATION FARMING

Land degradation continues to be the major concern for cropping and pasture lands in NSW, and the joint conservation farming program of the Department of Agriculture and the Soil Conservation Service is aimed at reversing this situation. The problem has also been highlighted by the Murray-Darling Basin Ministerial Council as one of the most serious issues affecting the equitable, efficient and sustainable use of the resources of the Basin.

The conservation farming program has been conducted at two distinct, but complementary levels: community awareness



The Agricultural Engineering Branch can advise farmers on the most efficient ways of matching and operating tractors and implements. With this rig, poor operating techniques could increase the fuel bill by 20 to 30%.

and farmer adoption. This format has been present in the four components: trees on farms, acid soils, conservation tillage and salinity.

Advisory

The farmer adoption aspect of the program continues to be coordinated through the activities of seven Regional Conservation Farming Committees, supported by research and advisory officers from both organisations.

Demonstrations of the integration of conservation farming practices with management of the whole farm, together with case studies and specific trials, were established to help the advisory campaign. In many regions, multidisciplinary teams promote conservation farming practices on a district or industry basis.

A wide range of activities has taken place across the State under the program, including 180 field days; 40 seminars/meetings; production of numerous press releases, radio broadcasts, television broadcasts, information sheets and newsletters; 10 major displays/exhibits; and 20 in-service workshops and courses.

There have also been separate but complementary activities in the component programs of trees on farms, salinity, and acid soils.

Planting and maintenance of tree plantings continued on government property and the

farms of cooperating landholders, and in-service training days were held in tree establishment techniques.

A major initiative was commencement of a series of one-day seminars for farmers, held in small local centres so clients do not have to travel far to get to them. The seminar program involves an indoor session in the mornings, with the emphasis on farm planning, and a visit to a nearby field site in the afternoon to inspect plantings and discuss species and establishment techniques. This format is well accepted by clients. To date, three seminars have been held in Region 5 with an average attendance of 17 people. Winter is the preferred time for holding these activities as most farmers are able to spare a day away from the farm at this time of the year. Local agricultural bureaus organise the seminars.

Salinity has been a major issue for the Murray-Darling Basin Ministerial Council and the Department prepared reports to enable the development of a salinity and drainage strategy for the Basin. The reports show that irrigated agriculture is experiencing substantial economic losses which could be reduced by regional drainage works and complementary on-farm management technology.

The Department of Agriculture and the Department of Water Resources have made joint studies of the drainage and salinity mitigation requirements for the Berriquin



A tree that is well located and looked after can provide shade for stock while denser stands of trees are useful for shelter and erosion control.

Irrigation District and the Jemalong and Wyldes Plains Irrigation Districts. Further liaison will continue as recommendations concerning on-farm technology are implemented.

Multidisciplinary teams are advising on efficient use of water in Sunraysia and reclamation of saline soil in the Wakool Irrigation District following subsurface drainage, and are conducting an information campaign in the Murrumbidgee valley.

Several in-service workshops on soils were held in regions, run jointly by the Department and the Soil Conservation Service. These helped officers to understand more about soils as an important resource, and the importance of soil management to the concept of sustainable production in agriculture. Specific issues such as acidity, fertility and erodibility were also covered.

Research

Conservation tillage research has continued to demonstrate the benefits—through reduced soil degradation—of practices such as no tillage and stubble mulching in northern NSW, direct drilling and stubble retention in southern NSW, and reduced cultivation and stubble retention in central areas of the State.

Tillage research was extended into irrigated agriculture where soil structural decline has resulted in inefficient use of water and in production losses from waterlogging.

Investigations into the establishment of trees and shrubs by direct seeding indicate that autumn sowing is best because it allows seedlings time to develop their root system before summer. Research is continuing into weed control and the use of tree guards to protect against animals and weather.

Research on salinity has extended to investigation of horticulture at Dareton and broadacre crops and pastures at Deniliquin. Substantial funding was obtained for a three-year project of salinity research through the Australian Water Research Advisory Council and the Federal Water Resources Assistance Program. This, together with existing staff resources and a planned new research facility at Deniliquin, will enable the Department to play an appropriate role in Australia's salinity research and to make the results known to farmers with saline or waterlogged land.

Results indicate that varietal differences and management practices are valuable

mechanisms for reducing the effects of salinity at farm level. For example, water quality affects salt uptake mechanisms; sprinkler irrigation under the trees reduces chloride damage associated with overhead sprinklers; rootstock types vary in their ability to exclude salt uptake; and tolerance to salinity in cereals varies little between varieties.

Current research is concerned with mechanisms of salt tolerance, leaching requirements for soils and crops, movement of salt and water in soils, expanding the range of data on crop yield response to salinity, and mechanisms for managing irrigation water of varying salinities.

Acid soil research continues and a major collaborative project under the National Soil Conservation Program has commenced at Wagga Wagga in association with the Riverina-Murray Institute of Higher Education, the Victorian Department of Agriculture and Rural Affairs, and CSIRO. This research assesses plant responses to lime and provides landholders with useful guidelines for the diagnosis and treatment of acid soil problems.

Education

The community awareness aspect of the conservation farming program continues to be well received and beneficial. A large range of media material is now in circulation and being used by radio and television stations. The latest is a community service video on 'Trees on Farms'. This aspect of the program is now being phased down to allow greater emphasis on technical consolidation and the development of technology packages for conservation farming systems.

FIBRES AND OILS

Cotton

The NSW cotton crop of 120 000 ha produced about 700 000 bales worth \$250 million in 1986–87, and was about 80% of the national crop. The area planted was 16% below the previous year because cotton prices were very low at sowing time. Production was down by 27% on the previous year's all-time record because of the smaller crop and poorer weather during the growing season.

Prices recovered from being very low at planting time to being relatively high by the end of the season, returning the industry to profitability. The high quality of Australian

cotton influences prices received and the strong demand for our product. On a world scale, the quality of Australian cotton is now regarded as being second only to that grown in California's San Joachin Valley.

Resistance by the main cotton pest, the cotton bollworm (*Heliothis armigera*), to two of the principal insecticide groups available to control it continued to be the major threat to the industry. The withdrawal on occupational health grounds of another product, chlordimeform, at the start of the season, threw greater pressure on remaining insecticides. Departmental scientists again monitored insect resistance levels in both NSW and Queensland during the year and, together with advisory staff, guided the industry through the season without a major breakdown in insect control.

The CSIRO-bred variety, Siokra, increased to 30% of the planted area—up from 10% in the previous year. Good yields and quality, resistance to bacterial blight and acceptance of the fibre on export markets are expected to see it become, in 1987–88, the first Australian-bred variety to produce the bulk of the cotton crop.

Bacterial blight (*Xanthomonas campestris* pv. *malvacearum*) can greatly reduce yields, but dry weather during summer kept losses low. Departmental scientists continued important research into the disease and its transmission in seed used for sowing.

Declining cotton yields in the lower Macquarie Valley are caused partly by subsoil compaction, yet deep ripping to loosen subsoils can be detrimental if the soil is too wet. Studies by chemists at BCRI indicate that deep-rooted rotation crops such as wheat and safflower help dry the subsoil before ripping and so improve soil structure. Allowance must be made, however, for the depletion of soil nutrients (including nitrogen) by these crops.

Soybean

Soybean production in NSW has more than doubled over the past five years and now represents about half the national crop. The greatest expansion has been in the northwest and southwest irrigation areas. On the north coast, while production has been stable, emphasis has changed from the lighter textured hill soils to the heavier alluvial soils closer to the coast, including sugarcane farms. The industry is now more soundly

based and yields are likely to be more stable than in previous years.

In 1986–87 a record 70 000 t is expected from a 35 000 ha crop with an on-farm value of \$10 million. Soybean plantings expanded considerably in the northern inland river valleys, corresponding to the reduced cotton planting.

Inverell is becoming the centre of the State's non-coastal dryland soybean industry. Local extension effort and use of the early-maturing variety, Valder, bred by the Department at Narrabri, have provided the basis for this industry. Good rainfall during summer produced above average yields. Development of a local soybean industry has enabled the town to establish a protein extrusion plant for the manufacture of stockfeeds.

Crop yields in the Macquarie and Lachlan valleys improved markedly this year as a result of better insect pest management. Department of Agriculture entomologists and advisory staff thoroughly monitored insect levels in the crops during the season and advised growers on management and control.

The Narrabri breeding program made further progress in developing superior lines for the northern inland and north coast areas. Several lines with tolerance to manganese toxicity are showing considerable promise at Grafton. A high-yielding yellow hilum line, suitable for use in products for human consumption, is being considered for release as a northern irrigated variety.

Surveys by departmental plant pathologists identified the three most damaging soybean diseases on the north coast as pod and stem blight (*Phamopsis* spp.), rust (*Phakopsora pachyrhizi*), and black leaf blight (*Arkoala nigra*). All three can cause serious loss of seed quality and of yield during wet autumns. Single, well timed applications of fungicide when disease incidence is moderate to high are followed by marked improvements in yield, but resistant varieties are seen as the longterm answer.

Rhizobiology research at Tamworth identified a soybean line of Korean origin which can fix much more nitrogen than commercial varieties, particularly in soils high in nitrates. These superior genes are being incorporated in commercial varieties. Researchers also showed that soybeans fix more nitrogen when sown in a no-till seedbed than when sown in soil cultivated conventionally.

Sunflower

Over the past five years NSW sunflower production has increased three-fold and has risen from 25% to 40% of the national crop. About 90% of the NSW crop is grown in the north under natural rainfall, while the remaining 10% is irrigated, and grown mainly in the central and southern river valleys.

The 1986-87 crop is expected to produce 86 000 t from 82 000 ha, down from the 1985-86 production of 99 000 t from 113 000 ha. Lower prices are the main reason for the fall. The early (spring sown) crop of 50 000 ha followed a hot, dry finish in December and January; but the late (summer-sown) crop of 32 000 ha received good rainfall and should give above average yields.

District agronomists continued to evaluate commercial and experimental hybrids at sites throughout the northwest, and to publish the results in the Agfact series. Growers welcome

these results as an aid to selecting varieties: the information is independent of the many, often conflicting, claims made by private seed companies for their hybrids.

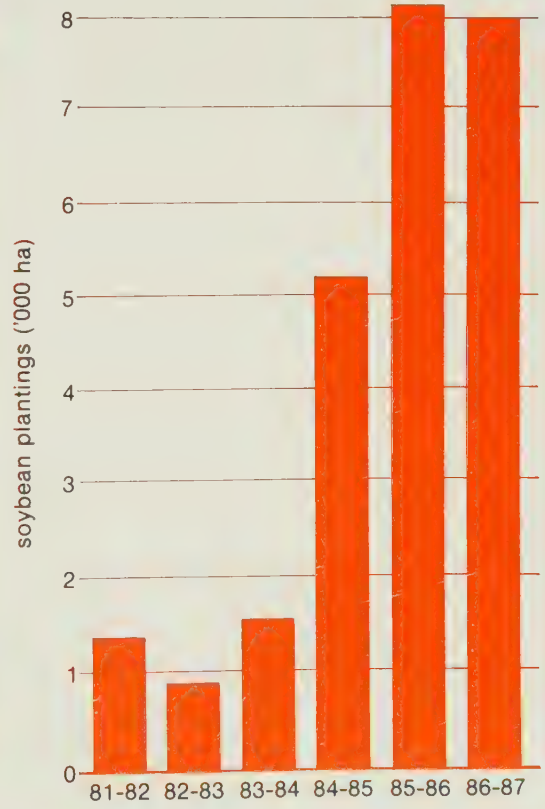
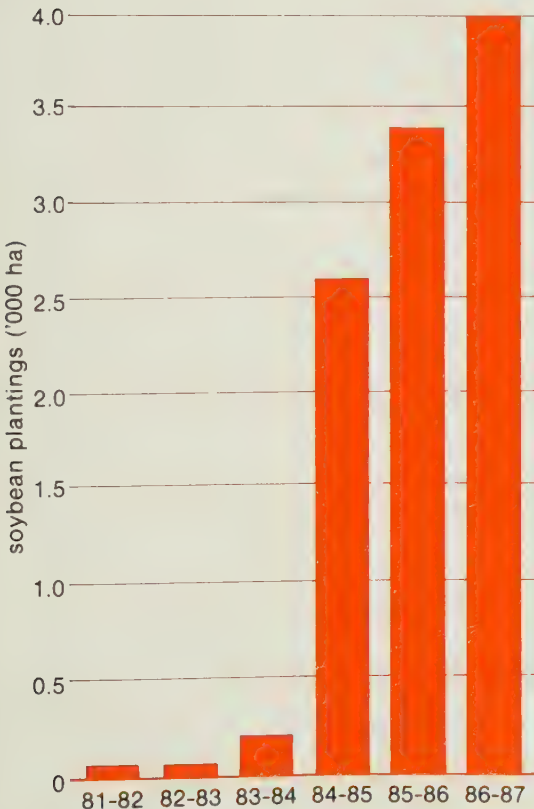
Rapeseed

The area planted to rapeseed in NSW increased 10-fold in the five years to 1986-87. The increase resulted largely from buoyant oilseed prices at a time of significant falls in returns from wheat and rice. Improved rapeseed varieties and better extension of the crop's value in cereal rotations have also been factors. Production reached a record high in 1985-86 when 46 000 t was produced from 40 000 ha. This crop represented about 60% of national production and was valued at \$12.6 million.

In 1986-87, lack of good rain at sowing time in central and northern areas, coupled with a price downturn, led to reduced

Since release of the cultivar Valder in 1984-85, a rain-grown soybean industry has developed on the northern slopes, centred on Inverell. This early-maturing, drought-resistant cultivar was bred and selected by the Department of Agriculture.

Soybean production in the southern irrigation areas has expanded dramatically since 1983-84 when the cultivars Chaffey and Bowyer were released. Bred by the University of Sydney, these cultivars were evaluated jointly by the University and the Department of Agriculture.



plantings of 42 000 ha. Favourable growing conditions resulted in production estimated at 50 000 t. About 14 000 t of the crop were exported by the Oilseeds Marketing Board to Japan, following a similar shipment from the previous crop.

The Department's breeding team at Wagga Wagga completed development of two improved *Brassica napus* varieties, known as BLN 270 and BLN 273. These varieties outyield all other commercial varieties in Australia, as well as having very high oil and meal quality and good disease resistance. Their release for commercial production in 1988 will significantly improve the quality of NSW rapeseed on the domestic and export markets, making it at least equal to the best in the world.

District agronomists continued an active extension program to acquaint wheatgrowers with the role of rapeseed in preventing root rot diseases in their cereal crops. More and more progressive farmers, particularly in central and southern areas, are harvesting higher wheat yields since they began growing rapeseed.

Safflower

Safflower is an opportunity crop in NSW with an average annual production of 6000 to 8000 t in recent years. While it is a fairly small crop, it is an important alternative for growers in certain areas of the State. Recent production represents 25 to 50% of the national crop, depending on fluctuating production in other States, especially Queensland. Production was severely limited in NSW and Queensland by recent very damaging outbreaks of *Alternaria* leaf blight, to which the only available variety, Gila, is highly susceptible.

Departmental agronomists have taken the leading role in coordinating the field evaluation and seed increase of two new disease-resistant varieties bred by CSIRO. These varieties, Sironaria and Sirothora, were released and will be available for commercial production in 1987-88. Sironaria, which is resistant to leaf blight, will make safflower production a much more reliable enterprise in northern NSW and Queensland. Sirothora, which is resistant to root rot, will allow safflower to be grown as an irrigated crop, which was not possible with Gila. Agronomists have developed an information package on growing irrigated safflower.

Other oil crops

Research into the agronomy of several other oil crops was commenced at the North Coast Agricultural Institute at Wollongbar. Of special interest are tea tree, lemon grass, geranium and a species of eucalypt. Guayule, an alternative source of natural rubber, is included in this program at Condobolin. Over 900 samples of guayule were analysed for resin and rubber content by chemists at BCRI.

GRAIN PRODUCTION

The area sown to wheat in New South Wales in 1986-87 continued to decline to an estimated 3 million ha in the face of increased subsidised sales by the USA and the European Community to some of Australia's traditional markets.

To a large degree, the total area sown to winter crops remained steady, with continued expansion of oats, barley and pulse crops. The high wool prices and improved outlook

NSW grain area ('000 ha)

	1982-83	1983-84	1984-85	1985-86	1986-87
Wheat†	3162	3999	3603	3668	3000
Barley†	387	544	605	553	450
Oats†	394	813	312	416	528
Triticale†		72	72	78	90
Grain sorghum	168	177	206	152	210
Maize†	12	11	19	16	20
Rice†	72	117	122	104	89
Lupins†	19	22	34	72	50
Field and other peas*	9	6	7	10	60
Faba beans*					5
Chickpeas*					17
Pigeon peas*					5
Mung beans*				9	15

Sources: † BAE Commodity Statistical Bulletin

* NSW Department of Agriculture estimates



Harvesting cotton at Narrabri. The Department's research and advisory programs on pest and disease control and soil fertility assist growers to maintain good yields and excellent quality in a product for which there is a strong demand on world markets.

for meat stimulated an expansion in sowings of oats for grazing and recovery for grain.

The substitution of significant areas of cereals by pulse crops helped keep expensive cropping machinery in use. Considerable additional benefits were derived from these crops in the increased soil nitrogen and reduced levels of soil-borne cereal diseases.

The effect of low wheat prices was most severe in the northwest of the State where broadacre grain farming had expanded rapidly over the last decade. Affected grain farmers had generally phased out sheep and cattle, and so lacked fencing and stock handling facilities. The high cost of stock and finance has now exposed them to the full impact of the cost:price squeeze.

The depressed market for cereals has led to development of new crops, as happened in

the crisis in 1969, which saw the successful introduction of rapeseed, lupin and sunflower industries.

Production

The 1986–87 wheat crop produced an estimated 5 000 000 t, of which 3 900 000 t was delivered to the central handling system. There was a marked increase in direct 'grower to buyer' and 'stockfeed permit' transactions on the domestic market and a considerable quantity of wheat was delivered from southern NSW into Victorian-operated silos.

As regards quality, the wheat, although generally free from weather damage, was

poor in protein. This continues the trend of the last few years, created as a result of heavy cropping pressures and reduced applications of superphosphate to clover ley pastures.

Over the past five years, the area sown to grain crops has fluctuated in response to falling wheat prices and the severe drought that extended from 1980 to spring 1982.

Crop improvement

The Department's work on all aspects of crop improvement was intensified, particularly in relation to grain quality and increased productivity. It also strengthened liaison with marketing authorities and end-users to ensure that the types of grain produced would hold or increase their competitiveness on world markets.

To enable the industry to adjust to the rapid change to new crops, the Department screened a wide range of genetic material and herbicides, evaluated the effects of control measures for diseases and insects, assisted in adaptation of cultural techniques and in developing markets, and expanded the registered seed scheme.

District agronomists throughout the grain-growing areas greatly expanded the number of trials conducted on farms to evaluate varieties and cultural practices. The Department also started work on a computer database that will contain detailed varietal, site and seasonal information, and will allow expansion and refinement of crop development procedures and recommendations. The Department released a number of new cereal cultivars, including the wheat varieties Sunbird, Sunco and Grebe, the oat variety Cypress and rice varieties Amaroo and Bogan. The two rice varieties are especially important as they are the first semi-dwarf, medium-grain varieties released from the Yanco Rice Breeding Program and are seen as replacements for the late-maturing variety M7 in the Murrumbidgee (Amaroo) and Murray Valley (Bogan).

The new wheat variety Grebe was released as a special-purpose soft wheat for production under irrigation in the south. It will be used exclusively by millers of soft wheat for the manufacture of biscuits, and its production and delivery will be controlled under contractual arrangements with the Australian Wheat Board.

Sunco has been recommended for planting in northern districts and Sunbird in southern

areas where these good-quality varieties exhibit improved yield and disease resistance.

In statewide programs aimed at reversing the problem of declining protein levels in wheat, the Department is examining and extending the use of nitrogenous fertilisers and legume rotations to improve crop nutrition.

A major and serious event during the year was the appearance of bacterial scorch (*Corynebacterium flaccumfaciens*), which attacked many summer-growing pulses. As this disease could cause serious losses, particularly in mung beans and cowpeas, the Department initiated production of disease-free seed.

Production services

The Grain Production Section assisted with several inquiries, including the Royal Commission into Grain Storage, Handling and Transport. The number of grain crop species in production is now close to 20, and each has a complex range of management needs and strategies.

IRRIGATION MANAGEMENT SERVICE

Extent of production

The estimated area of irrigated production in NSW remains stable at 770 000 ha using surface water and 50 000 ha from groundwater. About 75% of all irrigation continues through surface methods of application.

The gross value of production from irrigation in NSW is estimated at about \$750 million.

Advisory

Irrigation engineering and related administrative staff and functions were transferred from the then Water Resources Commission (now Department of Water Resources) to the Department of Agriculture on 1 July 1986.

The Department established the Irrigation Management Service to give multidisciplinary, whole-farm advice on irrigation to farmers. The transferred officers complemented the Department's existing skills in irrigation-related soil science, agronomy and horticulture. The creation of this type of advisory unit is a pioneering move in Australia.

The Murray-Darling Basin Ministerial Council announced plans during the year to sponsor a workshop in Yanco to examine



During the year, the Department established in the Irrigation Management Service to provide farmers with whole-farm advice on irrigation. On this farm, a centre pivot irrigator waters a crop of sunflowers.

more effective means of disseminating information on improved farm irrigation practices.

Farm water supplies loans

The Department was given the additional responsibility of advice to the State Bank as to the desirability of granting applications for low-interest loans under the Farm Water Supplies Act. The backlog of loan applications received in the transfer of this function was substantially reduced. The Department examined loan applications valued at about \$4 million and made recommendations to the State Bank.

Waterforce

In a project named Waterforce, the Department and the Irrigation Association of Australia jointly investigated constraints to profitability and efficiency affecting irrigated production in NSW. A report to the Minister was prepared by a steering committee chaired by Dr Hugh Barrett, an eminent consulting irrigation engineer and past President of the Irrigation Association of Australia. The report from the Waterforce committee found that some irrigation producers consistently make good profits because they:

- understand the pattern of crop growth and the factors that influence it;
- closely monitor critical factors affecting crop production when required;
- are organised to direct limited resources to crucial areas of their enterprises;
- carry out farm operations on time;
- select good soils for a particular crop;
- develop a good knowledge of available soil management technology;
- do sound forward planning and manage staff and finances well;
- select and adapt farm machinery for efficient operation.

Estimating crop water use

The program on estimation of water use by crops, operated by departmental irrigation specialists, provided information on correct timing of irrigation. A predictive computer model, based on a published FAO model, was refined. It uses daily meteorological information collected at the Department's research stations to calculate water required by crops for irrigation and the interval between irrigations at Dubbo, Griffith, Yanco and on the north coast.

This model was used to advise groups of district officers of the effect of current weather conditions on the likely frequency of irrigation.

Salinity mitigation

A major advisory program was initiated to overcome land salinisation and Murray River salinity. The program is aimed at changing on-farm practices so that deep drainage to the watertable under intensive irrigation will be reduced. Widespread adoption of improved irrigation practices will be one of the key factors required to overcome salinity problems in the long term.

Research

Irrigation research, involving many related disciplines, continues at 20 departmental centres on projects outlined in the Department's *Annual Report 1985-86*.

Research at Deniliquin into farm practices affecting land salinisation and waterlogging was upgraded, partly in response to the receipt of grants from the Commonwealth Government for research into advanced irrigation farming systems. The Department examined plans to obtain land for this program to complement the Commonwealth commitment.

PASTURES

Declining profits from grain crops have stimulated renewed interest in pasture-based animal production. Producers are interested mainly in selection of suitable pasture varieties and methods of re-establishment. Where fencing and animal handling facilities were removed during the cropping boom, the high cost of finance to replace them means that a return to pastures and animal production enterprises will be slow. In high-rainfall areas where grazing is the main enterprise, the increased emphasis on pastures is indicated by an increase of about 30% in the amount of superphosphate fertiliser applied to pastures during the year.

Longterm forecasts indicate that sheep and cattle numbers will increase and reach record peaks during the next five years. Promotional effort will be needed to ensure that markets are found for this extra production.

The formation of the Grasslands Society of NSW is a notable achievement, indicating a strong interest and confidence in pasture-based industries.

The Department substantially reviewed its pasture research policy and now supports national programs on breeding, selection and evaluation of lucerne and white clover. These are additional to the currently operating subterranean clover improvement program. The review also highlights the need for an effective procedure for evaluating legume varieties. This in turn requires facilities for increasing seed and distributing it to a network of testing sites.

Negotiations are underway for greater cooperation with DSIR in New Zealand. Interest in exchange of pasture cultivars and technology has been made more important by the introduction of Plant Variety Rights legislation in Australia.

Export markets for hay and cubes were pioneered, particularly in Japan.

Crop improvement

Lucerne. The lucerne breeding program based at the Agricultural Institute, Yanco, released an exciting new general-purpose lucerne with multiple disease and pest resistance. Aurora, as the new variety is called, will have wide application throughout Australia.

Further work at Yanco seeks to improve resistance to lucerne leaf diseases and is currently focused on developing a winter-active type with multiple resistance to root and crown rot, leaf disease and aphids.

Recently released commercial lucernes have been placed in the statewide evaluation program and will be established in the five primary sites and sixteen core sites throughout the lucerne growing districts of NSW.

Subterranean clover. A new series of core trials was established as part of the National Subterranean Clover Improvement Program. These will evaluate mid-season varieties suited to the 450–600 mm rainfall areas. The core trials will include *Medicago murex* and *Trifolium balansae* lines which may be suited to subterranean clover areas.

Native grasses. A national workshop was held at Tamworth to develop coordinated plans for the domestication and promotion of native grasses for a range of uses: amenity, landscape and pastoral. The grasses of most immediate interest include curly Mitchell grass (*Astrebla lappacea*), a range of wallaby

grasses (*Danthonia* spp.), weeping grass (*Microlaena stipoides*), and wheat grass (*Agropyron scabrum*).

Serradella. A line of serradella, GS046.1, was recommended for registration by the NSW Herbage Plant Liaison Committee. This has a similar maturity to Pitman and, judging by tests in NSW, has better aluminium tolerance and productivity than Pitman.

An earlier line GM065.2 is being further tested in NSW with the view to possible registration and release. Both lines originated in the WA Department of Agriculture's breeding program.

Medics. Research on species evaluation, conducted jointly with the SA Department of Agriculture, is continuing. Medics are widely used in NSW, but there is a need for persistent cultivars for areas that receive 300 to 400 mm annual rainfall.

Other species. Many new and improved cultivars of both commercial and public origin are being tested throughout NSW to develop Department of Agriculture recommendations for sowing.

In the Western Division research is being done on sheep and goats, and their effects on vegetation. An agro-ecological survey of graziers was conducted to assist in formulation of a guide to grazing management in the semi-arid rangeland areas.

Research at Walgett has established the merits of sowing curly Mitchell grass in the area. Technical problems of pasture establishment and maintenance there are the subject of further research. Bambatsi panic and buffel grass have also proved to be highly productive.

Soil acidification over large areas of the State remains serious. In an effort to overcome the problem, researchers are investigating inputs from plant breeding, crop agronomy, soil chemistry and root nodulation. The interrelationships between applied phosphorus and lime treatment are being studied, along with suitable alternative acid treatments such as sewage ash.

The root-rotting fungus *Phytophthora clandestina* was found to be widespread throughout subterranean clover areas and is thought to be an important factor in decline of subterranean clover pastures. Experiments

using fungicides to control root rots have been encouraging, but are as yet inconclusive. The longterm solution to this very serious problem rests with the plant breeders.

Advisory

A detailed advisory program on pasture improvement is being promoted throughout NSW. It has three main components: pasture establishment, cultivar recommendations and fertiliser management. Agfacts and other publications have been issued to emphasise these factors. Statewide varietal assessment trials with subterranean clovers, lucerne varieties and perennial grasses were established, and a wall chart listing the recommended cultivars for each area in NSW has been published. Computer-based models were developed to improve the delivery of advice on the economics of various application rates for superphosphate and lime.

There was also a major advisory program on acid soils, aimed at increasing the level of awareness of the problem and providing specific technical advice on treatment. New publications, a video film and display material are helping advisory staff to convey this critically important message to the State's farmers.

REMOTE SENSING

The Department of Agriculture leads the world in development of methods using remote sensing to manage regional resources. It is also one of three major users of satellite data for monitoring rural production. The other two programs using such data are the monitoring of irrigated lands in California, and the Canadian potato census.

This year the Department installed a graphics workstation to digitise, edit and plot data collected by satellite. This facility allows maps to be converted into computer data for automatic analysis and for construction of geographical databases of cropping and other activities.

Advisory

Landsat satellite images continue to be used to prepare 1:250 000 scale agricultural classification maps over extensive areas of the western slopes and plains of NSW. The method provides cost-effective and consistent extensive coverage, and identifies those areas requiring more detailed (and therefore more expensive) mapping.

Eleven district agronomists, whose districts cover about 40% of NSW, routinely use Landsat images (four per year) of their districts to:

- gain a much better appreciation of district activities and conditions, so they can better select and implement relevant advisory programs and plan travel around their districts more efficiently;
- assess crop area and condition;
- provide more effective liaison with farmers;
- improve briefings on district conditions for visitors and colleagues.

Research

The eight research and development projects in the Remote Sensing Section proceeded satisfactorily during the year. Highlights are:

- A weed detector, using remote sensing technology in the form of sensors attached to herbicide spray nozzles, is being developed. It will be able to detect and spray individual weeds and so improve the economics of no-till cultivation. The prototype, currently being evaluated at Tamworth, has successfully distinguished green weeds from other landcovers. The weed detector research program has been funded for a further three years, during which time it should reach a semi-operational stage.
- The rice monitor program successfully estimated the total rice area in irrigation areas in the 1983–84 and 1984–85 seasons using Landsat data. It has been implemented around Leeton during the 1986–87 season to evaluate the use of French SPOT satellite data for estimating the areas of individual rice and horticulture fields, with good results.
- Winter cereal cropping around Nyngan and Walgett was mapped by visual analysis of Landsat photographs. The results, using images at cultivation, canopy development and harvest, are shown in the table. Consistent results in 1987 will confirm the usefulness of this method for operationally measuring the area of NSW under extensive cropping.
- A cooperative project with the Western Lands Commission to monitor cropping and clearing in the Western Division proved successful in 1986. A management group from both organisations is being created to examine the results in 1987 with a view to recommending how the project can be made operational from 1988.

Accuracies in mapping winter cereals on successive images at Nyngan and Walgett for the 1986 crop.

Area	Stage	Cropping fields correctly identified	Missed	Field wrongly mapped as crop
		%	%	%
Nyngan	Cultivation	84	16	4
	Canopy	96	4	0
	Harvest	100	0	2
Walgett	Cultivation	65	35	4
	Canopy	66	34	4
	Harvest	94	6	0

The CSIRO office of Space Science and Applications (COSSA) has created a study group to look at prospects for remote sensing by satellite, particularly in relation to Polar Platforms to be launched by the USA and Europe in the early 1990s. The Department of Agriculture oversees agricultural interests and needs in this study group.

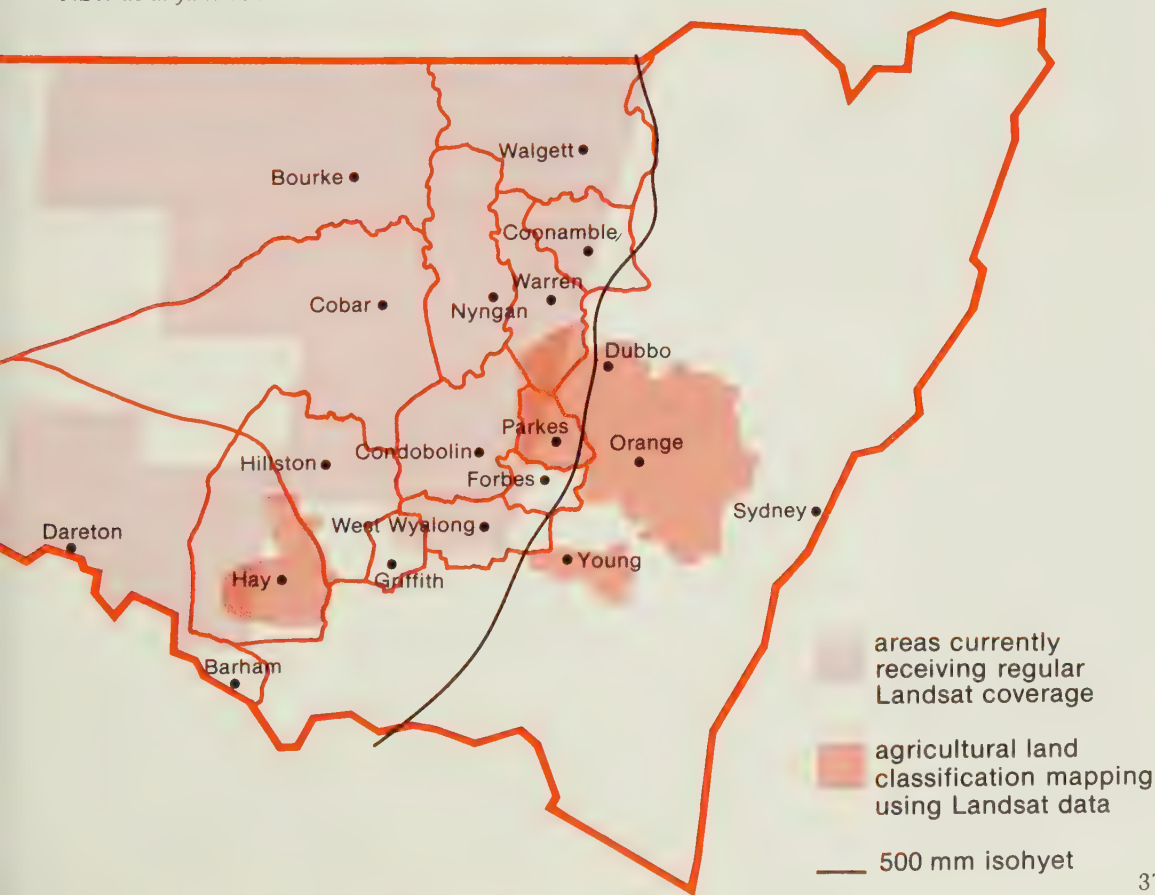
SEEDS

The Department of Agriculture conducts certified and registered seed schemes for all significant field and pasture crops. Seed for all winter cereal crops (wheat, oats, barley, rye, triticale) is produced under a registered scheme administered from the Agricultural Research and Advisory Station, Temora; and seed for grain legume, oilseed and pasture crops is produced under certified schemes administered from Sydney. The quality of seed is further improved by enforcement of provisions in the Seeds Act 1982 which require that all seed for sowing be labelled with specified information concerning the seed's sowing quality.

Research

A study of lucerne seed production completed at the Agricultural Research Centre, Trangie, increases our understanding of the reproductive lucerne plant. Findings were

Map showing the operational use of Landsat data in NSW as at June 1987.





The Department's contribution to cereal research—breeding of new varieties and testing for disease resistance—has helped farmers maintain yields despite changes in disease strains.

made the subject of a video presentation for producers of lucerne seed. The work has also provided significant information for inclusion in the LATIS (Lucerne Agronomy and Technology Information System) computer program.

Attention at Trangie has now turned to investigation of problems associated with seed production from native pasture species that are being assessed in other departmental research programs.

Pollination studies clarified the interrelationships between environmental factors and the effectiveness of honeybees in lucerne and weed management in seed crops of annual medic. There is an increasing demand for freedom from weed seed and

research programs throughout NSW have emphasised the need for cost-effective weed control programs in many herbage and grain seed crops.

Cooperative work with other organisations and institutions placed strong emphasis on seed production research. Postgraduate studies completed at the University of Sydney in 1986–87 developed testing methods to identify inbred seed in commercial certified hybrid maize seed. As a result, seed-testing staff can now use a rapid and cost effective technique to identify undesirable inbred seeds resulting from self-pollination within the hybrid seed production area.

Interest in new crops, especially the grain legumes (chickpea, lupin, faba bean, field

pea, mung bean), has brought its problems, as these crops are subject to various seedborne diseases and insect pests. Research and advisory staff are developing techniques to manage pests and produce high quality seed.

Advisory services

The modern seed industry involves production of a large number of species and cultivars. During the year, two new safflower cultivars, two chickpeas, one lucerne and several cereals were released for departmental certification. The Seeds Section introduced a new scheme for bulk seed certification and established a reliable certification system for annual pasture species.

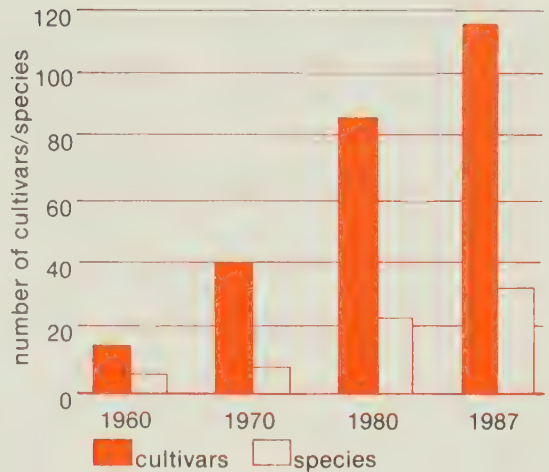
Certification and other specialised seed production services were provided by staff at Albury, Wagga Wagga, Temora, Cowra, Forbes, Dubbo, Inverell, Coffs Harbour, Taree and Nowra. The Seeds Laboratory in Sydney has a more specialised function and contributed to the advisory program by attending field days and grower meetings where it conducted demonstrations of seed testing technology.

Seed testing 1986-87

Certified and registered	1 072
Export and import	922
Regulatory	34
Police	254
Commercial	1 240
Miscellaneous	740
TOTAL	4 262

Regulatory services

During the year the bacterial disease *Corynebacterium flaccumfaciens* was detected in several summer grain legume crops, notably cowpea and mung bean, throughout NSW and in Queensland. Although the disease has probably been in NSW for some time, its occurrence at economically damaging levels was first recorded in the 1986-87 summer. The Department inspected potential seed crops and denied certification to any registered crops that were seriously infected. The longterm solution to the problem lies in production of 'clean' seed, commencing with small quantities now being grown in glasshouses. Seed thus produced will be grown for increase in areas known to be free of the disease.



Since 1960, the number of species and cultivars certified in NSW has been greatly increased, allowing growers to plant a wider range of crops with seed that is guaranteed pure.

The Seeds Section administers the Seeds Act on behalf of the Department. No prosecutions were recommended during the year. The regulatory program relied heavily on producer education as well as on increasing awareness among buyers of the need for quality seed and the advantages of labelling.

Diagnostic services

The seeds laboratory continued to test certified and registered seed and quarantine and export samples on behalf of the Department of Agriculture and quarantine authorities. As of 1 May 1987 it ceased to provide a traditional commercial seed testing service to the seed industry, thereby restricting its services to seed samples collected under departmental schemes or collected by agricultural inspectors under the Seeds Act, the Stock Foods and Medicines Act, and quarantine legislation. Industry has responded well to this decision. During the 12 months or so that the industry had to prepare its own seed testing services, several private seed testing laboratories have started accepting private commercial samples for routine testing. Negotiations to establish a responsible and acceptable accreditation system were initiated by the Department, and the National Association of Testing Authorities (NATA) agreed to implement such a system for Australian seed testing laboratories in line with those provided for other biological and technical laboratories.

WEEDS

Publications and advisory material

The most comprehensive book ever published on Australian weeds was released in March 1987. *Weeds—an Illustrated Botanical Guide to the Weeds of Australia* contains 650 colour photographs and line drawings and is published by Inkata Press on behalf of the New South Wales Department of Agriculture. The book gives detailed descriptions as well as notes on geographic origin, distribution and importance of each weed and is recognised as an essential reference for plant scientists, farmers and graziers, students and teachers of agriculture and horticulture, weeds officers, nursery operators, naturalists, and amateur and professional botanists.

The Weed Section has now published over 45 Agfacts on various weeds and weed control practices. It also produces annually the following publications for use by landholders and others wishing to control weeds: *Weed Control in Winter Crops*; *Herbicides for Weed Control in Lucerne and Pastures*; *Weed Control in Sorghum, Maize, Soybeans and Sunflowers*; and *Herbicide Recommendations for Control of Noxious Plants*.

A video on the identification and control of serrated tussock was produced by staff from the Agricultural Research and Veterinary Centre, Orange, and ICI (Operations) Australia.

Blackberry

The blackberry rust *Phragmidium violaceum*, first recorded on blackberries in south-eastern Victoria in 1984, is now widespread on coastal areas and has been found in many parts of the northern and southern tablelands. The most widespread type of blackberry in NSW, *Rubus procerus*, is only intermediate in susceptibility to the introduced rust, so to date the rust has had little effect in controlling blackberries, although the effects are more evident in moist, humid conditions.

Parthenium weed

Since border quarantine inspections were started in 1984 for harvesting equipment entering NSW from Queensland, the introduction and spread of parthenium weed (*Parthenium hysterophorus*) in northern NSW has been significantly reduced. Currently all known roadside and property infestations are

under control. During the 1986–87 harvest season, some 644 harvesters and equipment entered NSW from Queensland, with 359 using the East Goondiwindi crossing. About 50 headers had to be given further cleaning before being permitted to enter NSW.

The gall-forming ragweed moth (*Epiblema strenuana*), which has been used in Queensland for control of parthenium weed, is not fully established in northwestern New South Wales. Establishment in this area has occurred only at Narrabri, on Noogoora burr.

Herbicide-resistant ryegrass

The first confirmed report in NSW of resistance in annual ryegrass (*Lolium rigidum*) to the herbicide Hoegrass® (diclofopmethyl) was from a property at Howlong, near Albury, in 1986. The resistance was confirmed in bioassay tests carried out at the Waite Institute in South Australia. Hoegrass-resistant ryegrass has been reported in South Australia and Western Australia over the past two years but this was the first case in NSW.

Hoegrass has been used widely for control of annual grasses in cereal crops and the development of this resistance, which also confers cross-resistance to several other herbicides, means that strategies for control of annual ryegrass in winter cereals will need to be re-examined.

St John's wort

Morphological differences were observed between specimens of *Hypericum perforatum* collected from different locations in NSW and grown in a common environment at Bathurst. It appears likely that both the broad-leaved var. *perforatum* from northern Europe and the narrow-leaved var. *angustifolium* have become naturalised. There are differences between narrow-leaved forms that indicate the presence of other varieties, ecotypes or hybrids. The small-leaved var. *microphyllum* has not been found in NSW. Research staff are using morphology, cytology, electrophoresis and chemical analysis in an effort to distinguish between varieties.

A special meeting at Orange between officers from CSIRO, local government and the Department of Agriculture discussed the St John's wort problem and developed a policy for control embracing an integrated approach to pasture improvement, goats and chemical control.



Research Agronomist Ted Knights (right) discusses the results of a chickpea trial with Brian Hare and Leonard Seong from Pacific Seeds. Interest in chickpea growing is increasing in NSW as farmers realise its potential as an alternative crop to wheat.

Weed control with goats

Goats are being used increasingly to control weeds in NSW. Field days held across the State have promoted this method of control, especially for blackberry and other woody weeds. A large-scale demonstration site was established by the Soil Conservation Service and the Department at Windamere Dam, using goats as part of an integrated approach to control of blackberry and sweetbriar (*Rosa rubiginosa*). Results to date show that goats give excellent control but stocking rates must be adjusted according to the amount of available plant material.

Use of herbicides on woody shrubs

Trials to develop economic use patterns and define correct application techniques are being carried out on blackberry, lantana (*Lantana camara*), sweetbriar, Bitou bush (*Chrysanthemoides nouibifera*), eucalypt regrowth (*Eucalyptus* spp.), Australian blackthorn (*Bursaria spinosa*), wild olive and honey locust.

Techniques tested include the use of high volume and low volume spraying of bushes, as well as basal bark, cut stump and stem injection treatments. Trials at the John Macarthur Agricultural Institute, Camden,

showed that a basal bark treatment on wild olive using trichloropyr in distillate gave excellent control.

Research

Weed control in nursery stock. Gosford Horticultural Research Station conducted work which led to the registration of a pre-emergent herbicide (oxadiazon) as an economical alternative to hand weeding for controlling weeds in nursery pots. It was observed that populations of mouse-eared chickweed (*Cerastium glomeratum*) and common chickweed (*Stellaria media*) increase, while summer grass (*Digitaria* spp.), bittercress (*Cardamine hirsuta*) and willowherb (*Epilobium* spp.) are controlled, when using this treatment.

Experiments compared the weed control efficiency and phytotoxicity of a granular mixture of oxadiazon and simazine, and oxadiazon alone, on 16 species of Australian native and exotic ornamental plants. Oxadiazon alone produced no symptoms of phytotoxicity, but the granular mixture produced leaf burn on half the species. Control of the two chickweeds was not improved by the mixture.

Weed control in field crops. The Weed Research and Demonstration Units at Orange and Glen Innes screened herbicides for efficacy against a range of troublesome weeds in field crops. Work was conducted in winter cereal crops, field peas, lupins, pigeon peas, soybeans, mung beans, cowpeas, chickpeas, pasture seed and lucerne for the control of a range of important weeds. This work has been instrumental in registration of several herbicides for weed control in these crops.

True scotch thistle. A 40 ha paddock was grazed with goats, sheep and cattle from July 1985 to February 1987 and the effect on scotch thistle (*Onopordum illyricum*) noted. Goats grazed flowering plants of *O. illyricum* in mid summer, and non-flowering plants in late summer and early autumn, but virtually ignored it in other seasons. The total groundcover of *O. illyricum* in the paddock was reduced from 10% to 0.1% during the period, whereas groundcover in adjoining paddocks grazed by sheep and cattle remained stable at between 10% and 40%. The feed value of young *O. illyricum* was high and that of flowering plants, moderate.

Weed seed pools. A project at the Agricultural Research and Veterinary Centre, Orange studied changes in plant density and pools of buried weed seed in three cropping systems (direct drill, deep inversion and conventional cultivation). The weeds—annual ryegrass (*Lolium rigidum*), wireweed (*Polygonum aviculare*) and wild oats (*Avena fatua*)—persisted and seed banks were maintained irrespective of the cropping system used.

A method which more effectively disrupts seed life cycles must be found for efficient longterm weed control. Preliminary work on evaluating a seedborne fungus for control of annual grass weeds has been successful.

Biological control. Cochineal (*Dactylopius* spp.) and cactoblastis (*Cactoblastis cactorum*) are still being mass reared as biological control agents for noxious cacti such as tiger pear (*Opuntia aurantiaca*) and common pear (*Opuntia stricta*). These cacti are distributed throughout the State, but are most abundant in the more arid areas west of the divide.

Research with a fungus (*Colletotrichum* sp.) for the control of Bathurst burr (*Xanthium spinosum*), has shown promising results in controlled environment conditions. Techniques for mass rearing the fungus were developed, using submerged culture and liquid fermentation.

Other fungi are being investigated for the control of other *Xanthium* spp. weeds, including noogoora and Hunter burrs.

Ragweed moths (*Epiblema strenuana*) have established well on ragweed and are spreading rapidly. The height of plants has been halved and flowering considerably reduced. Salvinia flea beetles (*Cyrtobagous salvineae*) are established but spreading slowly. Groundsel bush gall fly (*Rhopalmyia californica*) is now distributed throughout infestations of groundsel bush in the region. Monitoring of release sites has indicated variable results from complete plant death to minor reductions in flowering or failure to establish. The gall fly appears to have reached an equilibrium and is only working effectively in the more fertile and sheltered areas.

Herbicide residues in soil. Repeated applications of atrazine and glyphosate at over twice the recommended rates were shown to have no adverse effect on carbon cycling in a fallow/sorghum/wheat cropping system or on benefits in terms of grain yield

per unit loss of carbon. Carryover of excessive atrazine residues did not pose a problem on an acid red-brown soil. The severity of injury from atrazine was related to application rate, crop tolerance, and the distribution of atrazine in soil. Cultivation was shown to reduce the concentration of atrazine available for weed control at the soil surface and to increase atrazine damage to wheat. It was noted that sowing a susceptible crop under the atrazine zone did not prove successful in all seasons and this practice should be discouraged. Herbicide simulations conducted over a 10- to 30-year period have indicated that application of atrazine in autumn or winter could improve reliability and length of effective weed control by this herbicide.

PRICKLY-PEAR DESTRUCTION COMMISSION

The Prickly-pear Destruction Commission is a statutory authority established under the Prickly-pear Act 1924, as amended. It issues a separate annual report.

Surveillance program

The Commission's property re-inspection control system indicated that 3638 prickly-pear infestations required surveillance

inspections during 1986–87. Of these, 2123 related to periodical surveillance of Class 1 and Class 2 infestations. The remaining 1515 are Class 3 and 4 infestations that require yearly monitoring to ensure that control measures are effective.

Inspection results in the year under review indicate that landholders are showing increased preference for biological control methods. One result of this is that infestations of prickly-pear may, at times, appear to be more noticeable than in the past. However, longterm control is equal to that achieved by the use of chemicals, and is environmentally preferable.

Research

A common pest pear problem is now being studied near Turondale. This monitoring program began early in 1985 when prickly-pear cochineal was introduced to part of the population. *Cactoblastis* has not been very successful in controlling common pest pear in this or similar areas with cool winters. There has been a marked increase in insect numbers at the Turondale site. Older pads are now dying as the result of attack by cochineal and the prospects for longterm control appear promising.

PLANT QUARANTINE AND EXPORT SERVICES

COMMONWEALTH FUNCTIONS

As agent for the Commonwealth Department of Primary Industry, the Department administers agricultural quarantine under the *Quarantine Act* 1908, and export of grain, field crops, fruit and vegetables under the *Export Control Act* 1982.

The Commonwealth has incorporated inspection services relating to both Acts in the Australian Quarantine and Inspection Service. A formal agreement between the Commonwealth and State for provision of these inspection services has been signed.

Agricultural inspectors operate under these Acts and 10 State Acts, the main ones being the Plant Diseases Act, the Horticultural Stock and Nurseries Act, and the Seeds Act.

Agricultural quarantine

Importation of all goods (including plant, machinery and cars) and entry of passengers

travelling by sea and air are subject to surveillance for agricultural quarantine purposes.

Passenger clearance by air. A total 11 532 civilian and 329 military flights were serviced, 1916 more than the previous year. A total 1 895 866 passengers and crew were cleared, with 19 985 quarantine seizures. The passenger increase was 10% but seizures dropped 31%.

Passenger clearance by sea. A total 128 passenger and naval vessels and 164 yachts were cleared, with 592 seizures from 62 650 passengers.

Parcels post. A total 39 831 parcels inspected at Clyde and Newcastle resulted in 4540 items requiring attention for agricultural quarantine.

Containerised sea cargo. The number of vessels discharging containerised cargo increased from 905 in 1985–86 to 1071, with 205 290 containers being discharged. A total of 91 047 containers were subject to quarantine impediment and 4141 were fumigated before release.

Insects and related organisms intercepted. A total 1430 insect interceptions were submitted for identification. Giant African snail (*Achatina fulica*) was intercepted on six occasions and Siricidae woodwasps on 24 occasions. The drywood termite (*Incisitermes minor*) was detected in packing cases at the RAAF spare parts store in Dubbo. Exotic snails and slugs were collected from nursery stock, fruit and flowers on 13 occasions.

Nursery stock. A total 129 690 plants were inspected from 331 consignments. There was a large increase in ornamentals and bulbs, but a decrease in orchids and tissue-culture flasks. Several large consignments of carnations from elite European sources totalled 47 784 plants. The Plant Quarantine Station, Rydalmere, isolated 13 diseases from imported plant material during 1986–87.

Timber. The amount of timber imported totalled 488 320 m³. Of this, 28 406 m³ was fumigated for insect infestation. A total 447 insect infestations were noted during the year, with a marked increase seen in timber of North American origin.

Quarantine promotion

The increase in quarantine promotion commenced last year has seen an appreciable drop in seizures from air and sea passengers and an increase in items declared at the International Terminal, Mascot. Large quantities of leaflets were distributed to travellers and a self-service leaflet stand in the main departure area at Mascot was well patronised.

Administration

There were 62 294 import permits issued, raising a total \$2,918,512 for quarantine services. There were 103 prosecutions involving agricultural products during 1986–87, resulting in the imposition of \$22 480 in fines.

Quarantine review

The Department of Primary Industry commissioned a review of all aspects of agricultural quarantine. This review, led by Professor D. Lindsay of WA, is to report by May 1988.

Review of qualifications and training

The Director of Plant Regulatory Services reviewed qualifications and training of the Australian Quarantine Service in 1986. During 1986–87, the recommendations made in this review were supported by the Public Accounts Committee and adopted by the Department of Primary Industry for both quarantine and export inspection. The basic infrastructure has now been established for uniform training of personnel with the appointment of a National coordinator, State coordinators, and a curriculum committee to develop training material.

Exports

Grain. New automatic sampling equipment became fully operational at the Sydney and Newcastle Grain Terminals. Exports of bulk grain, particularly wheat, were fewer than in the previous year. This was due to a lighter harvest and to major construction work at Newcastle, which limited throughput.

Bulk grain exports for 1986–87

Grain (tonnes)	Passed (tonnes)	Rejected
Wheat	3 602 876	2 394
Barley	16 300	—
Sorghum	13 967	16 200
Rapeseed	13 906	—

Inspectors surveyed 124 bulk ships before they loaded grain and 32 of these ships required treatment and re-inspection.

Field crops. There was a large increase in the export of double-dumped baled lucerne hay to Japan. Most of the lucerne hay was exported through the port of Melbourne. Statistics on other field crops are as follows:

- 1086 containers of cotton and cottonseed exported, mainly from the Namoi Valley;
- 460 containers of malt barley exported from Tamworth;
- 5444 phytosanitary certificates issued for various grains, field crops and other plant products.

Action on packages of fresh fruit and vegetables exported

Crop	Inspected	Rejected
Apples	182 970	7 106
Pears	56 515	3 595
Citrus	491 671	17 742
Grapes	352 344	6 564
Stone fruits	315 562	4 871
Strawberries	35 625	1 847
Pineapples	4 975	1 320
Mangoes	29 392	1 592
Rockmelons, honeydew melons	174 506	5 243
Kiwifruit	82 671	2 162
Tomatoes	60 419	1 982
Other fruits	69 332	535
Potatoes	28 971	4 121
Onions	139 277	11 270
Asparagues	88 460	235
Broccoli	177 473	1 466
Cabbage	12 508	—
Cauliflower	23 174	577
Celery	22 821	135
Carrots	42,408	849
Capsicum	69 877	1 756
Lettuce	109 032	281
Other vegetables	141 164	1 873
Total	2 711 147	77 122

Fruit and vegetables. Major exporters continued to increase the volume of exports, mainly to well established markets. Limited quantities of oranges, grapes, stone fruits and onions were exported to Europe. These markets had not been supplied by Australia for many years.

Exports of apples, citrus, grapes, stone fruits, melons, onions and most other vegetables increased.

STATE FUNCTIONS

Plant Diseases Act

During 1986–87, 720 notices were issued and 7 prosecutions undertaken.

At the Flemington and Newcastle Wholesale Produce Markets, 2371 detention notices and 5148 castaway certificates for unsound produce were issued.

District inspections by agricultural inspectors

Orchards, etc.	11 331
Fruit shops	4 406
Grain storages	562
Nurseries	2 611
Resellers	2 273
Home gardens	23 322

Packages detained at markets for non-compliance

Crop	Packages	Bulk bins
Apples	19 179	81
Pears	14 517	37
Oranges	14 958	49
Lemons	1 256	—
Grapefruit	2 379	1
Mandarins	2 001	—
Grapes	4 852	—
Rockmelons	2 843	—
Bananas	29 873	—
Tomatoes	15 353	—
Mangoes	691	—
Potatoes	90 578	14
Onions	15 605	—
Other	16 028	19
Total	230 113	201

Major pest control programs

Provisions of the Plant Diseases Act (NSW) complement the Australian Quarantine Act in preventing the spread of new pests and diseases and controlling established ones.

Chrysanthemum white rust. The exotic disease chrysanthemum white rust (CWR) (*Puccinia horiana*) was detected for the first time in Australia in a Victorian plant nursery in November 1986. The nursery had distributed plant material throughout Australia. On overseas advice that the disease could be eradicated by destruction of infected plants and thorough applications of fungicide, a national eradication program was mounted. This appeared successful until the onset of cool, wet weather. Despite the destruction of over 63 000 plants in NSW, CWR continued to spread. By May, 32 properties were infected and it was demonstrated that CWR spores were spreading up to 1 km on wind-borne moisture droplets. On this evidence the national campaign was abandoned and replaced by an advisory campaign aimed at controlling and containing CWR.

Potato cyst nematode. Potato cyst nematode (PCN) (*Globodera rostochiensis*) was found for the first time in Australia in an area south of Fremantle, WA. A prohibition on the importation of potatoes from WA into NSW was imposed immediately. The Commonwealth and States have funded an eradication campaign. Intensive surveying of all potato crops in WA showed the infestation to be limited to 5.7 ha of the total production

area of 1904 ha. Recent consultations reveal most States want another year's survey results before re-introducing WA potatoes for table use. Surveys of potato crops in NSW have not revealed any PCN.

Fruit fly. An isolated outbreak of Queensland fruit fly (*Dacus tryoni*) in the centre of Griffith ended a four-year period of freedom from fruit fly in the area. This means that the expanding citrus exports to New Zealand will be subject to fumigation or cold sterilisation treatments before leaving NSW for a period of 12 months.

The outbreak was unfortunate, as the general results of whole-town baiting treatments by the Department and local councils had been highly successful. Monitoring of former trouble spots trapped only one fruit fly at Albury, twenty-five at Wagga Wagga and two at Temora.

Warehouse beetle. Following the intensive inspection and control program conducted in 1982, the warehouse beetle (*Trogoderma variabile*) population has remained low. Surveillance by inspectors has revealed only occasional light infestations in Griffith and Gunnedah, but recurring light infestations in rice storage centres continue to cause concern.

European wasp. A few nests of european wasp (*Vespula germanica*) have been detected and destroyed over a large area of south-west NSW but most are still in the Sydney Metropolitan Area. After four years in which nests destroyed by the Department doubled each year, an equilibrium appears to have been reached. Nests destroyed by the Department totalled 318 in 1984-85, 296 in 1985-86 and 269 in 1986-87.

Bunchy top of bananas. There was an upsurge in bunchy-top disease of bananas from 1402 infections in 1985-86 to 4618 in 1986-87. This can only be attributed to a lower level of industry support for plantation inspection during the year.

Extensive animal industries

Intensive animal industries

Animal health services



EXTENSIVE ANIMAL INDUSTRIES

SHEEP

Meatsheep Testing Service—a world first

The Department's unique Meatsheep Testing Service for the lamb industry's stud breeders has now won international and Australia-wide recognition. The value of this service, based at Cowra and operated since 1981 throughout NSW, has long been recognised by farmers. A recent examination of the service's results by departmental geneticists, based on a subsample of 22 000 Poll Dorset rams drawn out of 79 000 animals tested since 1981, conclusively demonstrates the service's achievements.

In particular, the service is 60% more efficient in identifying genetic differences in fatness than techniques used elsewhere in the world. The study also confirmed the merit of the service's practice of adjusting fat depth records for differences in liveweight. This means that animals selected for leanness at eight to 12 months of age (the policy of the service) have a major impact on the leanness of their progeny at the normal slaughter age of four to six months.

The Department's service has now been adopted as a model for use in all States as part of Australia's first national performance testing scheme for the lamb industry. This scheme, sponsored by the Standing Committee on Agriculture and known as Lambplan, will be launched during 1987–88.

In addition, New Zealand has adapted the NSW service to produce a similar service as part of its national sheep recording scheme, Sheepplan.

During 1986–87 more than 18 000 sheep from over 130 000 flocks in NSW were tested by the service for growth rate and leanness. The Department is now testing a third of all short-wool rams sold each year in NSW.

Suckling lamb and sheep dairying industry

One of the more exciting new developments is the emergence of a suckling lamb and sheep dairying industry in the southern irrigation areas of NSW. Suckling lamb (6 to 10 kg carcase and four to six weeks of age) is prized by certain ethnic communities and the sale of lambs at this young age allows the ewes to be milked for cheese production.

The industry, potentially worth over \$70 million, was initiated through research

conducted by the Department at Leeton over the last 10 years. The Department has played a key role in assisting the local establishment of this industry with further research, technical advice, and seminars, meetings and workshops held for producers. The industry is an added option for existing lamb producers and a profitable alternative for rice-growers.

Tavella Cheese Pty Ltd, the Leeton-based company that presently controls commercial aspects of the industry, has a current demand for some 4000 suckling lambs per week. Most of the meat is exported to Italy and Belgium, but some goes to Japan, Hong Kong and the USA. Two sheep dairies, one commercial and one research, are already in operation, milking 300 to 400 ewes twice daily. Two more commercial dairies under construction should be operational by July 1987. All the sheep's milk cheese produced there is currently sold readily in Australia but a significant export trade is expected to develop.

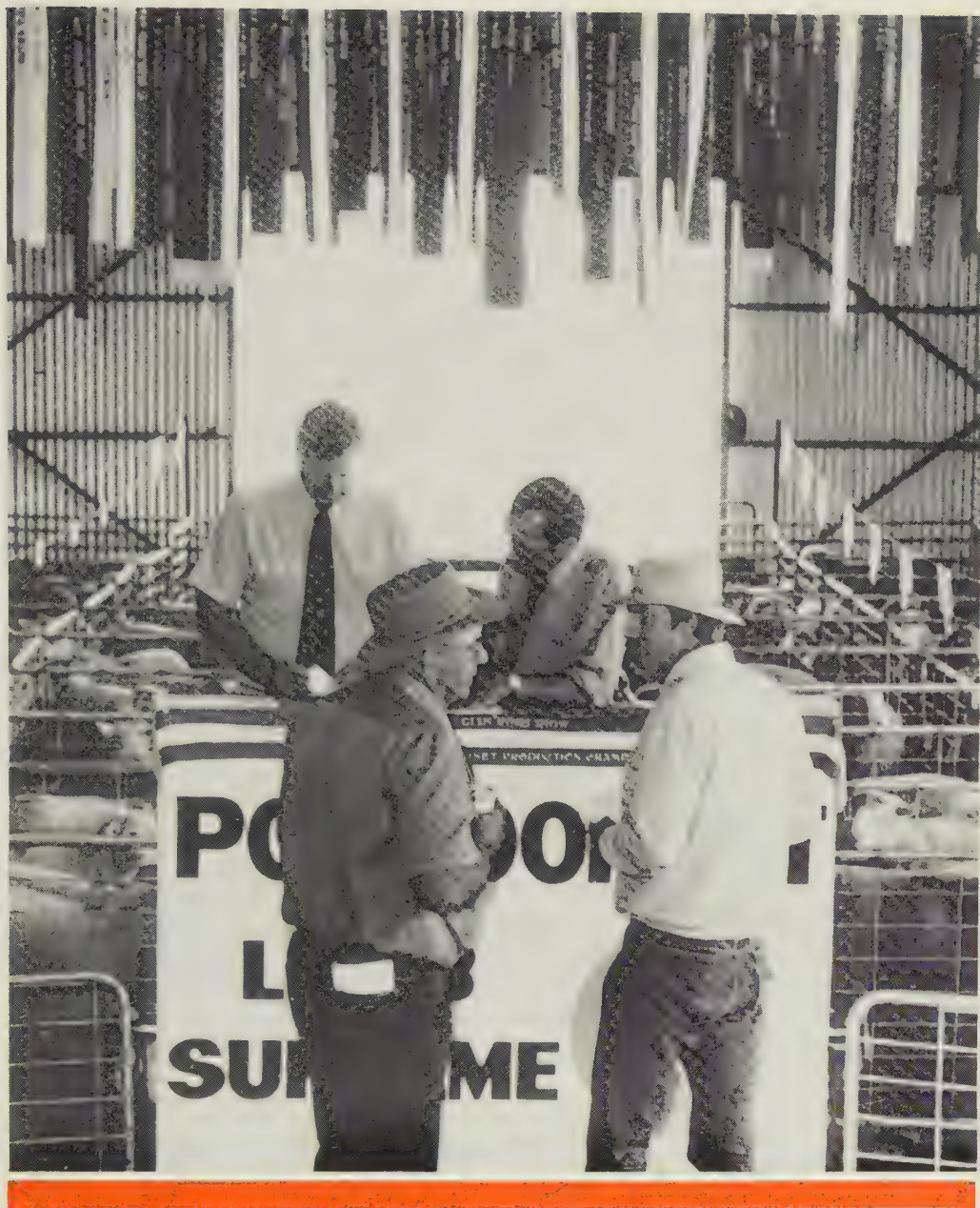
The new breed of sheep, Hyfer, being developed by the Department for high reproductive rates and out-of-season breeding, has a lot to offer this developing industry. Intensive sheep production systems and year-round production will be possible without the high cost of hormone treatments. The Hyfer is now being evaluated under field conditions and is performing exceptionally well.

Fleece Measurement Service

The Department's contribution to genetic improvement of the wool-producing industry continues to expand.

In 1986–87 there was an increase to 60 250 in the number of wool samples submitted by 240 ram breeders to the Department's Fleece Measurement Service for fibre diameter determination and ranking of related greasy fleece weight. This represents an estimated 50% of rams sold in NSW and includes many of the major ram suppliers. Around 70% of NSW ram breeders now use fleece measurement services.

Production performance measurements now provide the basis for 46 production sales conducted by Merino studs throughout the State and ram buyers have responded by



Breeders take part in a ram auction based on the Meatsheep Testing Service's processed information. During the year, sheep from over 130 000 flocks were tested by the service for growth rate and leanness.

consistently paying more money for rams testing out as heavy cutters. The Department takes part in about 40 production competitions which are strongly supported by producers and which highlight production characters of major economic importance.

Many important developments from the Department's Fleece Measurement Service have been incorporated in the national performance recording scheme, Woolplan, which was launched in March 1987. Woolplan will link accredited fleece testing laboratories through a common set of guidelines and formatted computer printouts, and will provide more advanced and detailed information on selection of top-performing rams as sire replacements.

Selection and breeding of Merinos

Breeding policies that emphasise all economically important traits are being developed for the genetic improvement of total flock productivity in Merino sheep. The breeding programs are based on information collected on Trangie flocks selected since 1951 for either hogget clean fleece weight or weaning liveweight, and on 15 recently-established random-bred flocks of contemporary Merino types.

During the past year, departmental analyses estimated the extent to which many fleece components and quality characteristics that are important in Merino industry selection programs are genetically determined. Genetic associations were also established between these characteristics and other production traits of major economic importance—e.g. reproductive performance and bodyweight. These analyses have produced the best available estimates of genetic variation in aspects of lambing performance in the Australian Merino. They also provide accurate information for Merino breeders on the potential for improvement of lambing performance by selective breeding.

Computerised management packages

Computerised packages are being used increasingly in development of advisory recommendations and to assist on-farm decision making. These range from basic spreadsheet programs to a complex biological model capable of simulating all or part of the sheep production system. The packages make it possible to look at the financial, nutritional and management impact of an enormous range of options.

Drought Pack III and Feed are two programs developed by the Department and now available to individual producers for use in working out drought strategies and feed rations.

Grazfeed and Lambalive, developed jointly by the Department and CSIRO, provide valuable assistance to on-farm decision making.

Grazfeed predicts pasture intake and the effect of supplementation on sheep production. It calculates the economic consequences of supplementary feeding and the likelihood of achieving production goals.

Lambalive determines the probability of lamb losses associated with adverse weather at specific times of the year—an important factor in deciding when to lamb. The package incorporates historical meteorological data from the major sheep production areas of the State.

The Sheepo program, developed by the Victorian Department of Agriculture and Rural Affairs, has been validated by this Department for improved annual pastures in the southwest of NSW. Sheepo simulates the total sheep enterprise and enables advisers to assess the effects of a management decision on the enterprises as a whole, in both physical and economic terms.

Wiregrass control

The problem of wiregrass (*Aristida ramosa*) on the northern slopes and tablelands is being tackled by the formation of a local wiregrass action group and use of a management program developed by departmental livestock officers and agronomists to control wiregrass economically. Under the program, burning and strategic stocking management are used to limit the seeding of wiregrass and to give more productive, problem-free, cool-season species such as wallaby grass (*Danthonia* spp.) a competitive edge. Wiregrass causes significant economic loss through reduced stocking rates, contamination of wool and physical damage to skins and carcasses. Producers who have used the wiregrass control program are helping to demonstrate the technique to others.

Nutrition

Research on nutrition focused on understanding the protein requirements of sheep as part of the total nutrient balance required for efficient production. The need for

rumen bypass protein was identified and quantified, and practical methods of feeding small, regular amounts of protein supplement to sheep in commercial enterprises are now being investigated. This technology has enormous implications for the profitable use of vast expanses of crop stubble and dry pasture that characterise sheep production areas in NSW.

A unique management system using an integrated crop and pasture approach to winter–spring nutrition was developed for the southern slopes. Greater flexibility, and sustained weight gains of 180 g per head per day, can be achieved by alternate grazing of dual-purpose oat and wheat crops. This leads to improved animal production from spring pastures because of the deferred grazing pattern. This system was refined during 1986–87.

Handling facilities

The Department works with suppliers of equipment and material to improve labour efficiency and advise producers on the latest technology available for design, construction and operation of sheeyards and sheds.

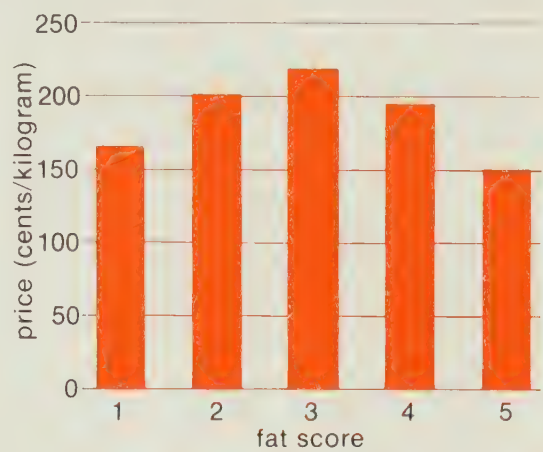
Improved profitability in the sheep industry has led to increased investment in handling facilities and increased demand for advice on updating and rebuilding such facilities. Technology recommended by the Department and adopted by many producers includes:

- New shearing sheds built with improved catching pens, raised shearing boards and multi-purpose wool rooms. Many of the State's 20 000 shearing sheds are being remodelled by installation of lift-swing, slide-swing and tip-swing gates. Better lighting and ventilation systems are improving working conditions.
- Sheeyards built on the bugle principle with a double working race, which make use of sheep behaviour patterns to reduce the labour required for management operations. Existing yards are also improved by incorporating bugle design principles in the sheep working area.

Lean lamb

To help information on consumer requirements reach producers more quickly, the Department started a wholesale market report for lamb in January 1987. The report shows clearly that leaner lamb attracts

premium prices. Fat score 3 fetches the highest price per kilogram for the carcase, with significant discounts applying as the lambs get fatter (and also if the lambs are too lean).



Wholesale prices reflect a consumer preference for lamb at fat scores 3 and 2. Lamb that is overfat or too lean brings lower prices.

The Department has made an important contribution to efficient production by helping the industry to respond to consumer pressure for leaner lamb. Its officers have given training in live sheep appraisal to lamb producers, agents and buyers, and have developed a complementary system that standardises description of carcase characteristics. This system forms the basis for major initiatives in livestock trading, including Computer Aided Livestock Marketing (CALM), so that producers can develop a product to defined specifications, and market signals can flow undistorted back from the consumer.

The Department's meatsheep specialist and a researcher visited New Zealand to study lamb production and marketing. This study will form the basis of a lean lamb advisory program to assist producers in meeting changing market requirements. Already, recommendations have been developed for ram lamb/cryptorchid production. Breeding for larger, leaner lamb is incorporated in the Department's genetic improvement program, and Royal Agricultural Society carcase competitions at Cowra and Guyra both featured cryptorchid lambs among the top placegetters. All of the prizewinners at Guyra were sired by rams

that were performance-tested through the Department's Meatsheep Testing Service.

Feeds evaluation service

During 1986-87, the Department's feeds evaluation service at Glenfield analysed 2183 samples of feedstuffs for extensive livestock. Of these, 643 were grains, 200 scrubs, and 571 pasture or forage crops. The remainder were by-products, silage and miscellaneous feeds. In cooperation with district agronomists, 442 samples were analysed from 26 agronomy trials conducted at various locations throughout the State. The Service only accepts samples submitted by departmental staff on behalf of producers.

Unnecessary analyses are being eliminated by computerisation of sample records: new grain samples need only be analysed when results from similar material are not present in the database, which now records over 2500 feed analyses.

Recent comparison of data has shown no variation in energy content between different samples of wheat, triticale, barley, sorghum and maize, but oat samples vary considerably in their energy content.

The Australian Feedstuff Information Centre database received 750 pasture analyses from the North Coast Region in 1986-87. Entries for this Region are up-to-date, with over 6000 pasture analyses since 1969 now available for retrieval through microcomputer. Results will also be made available in bulletin form.

Feedstuffs for intensive industries are analysed at the Agricultural Station, Seven Hills. Of the 528 samples analysed in 1986-87, 158 were grains, 223 were mixed feed samples, and the remainder concentrates and other feed ingredients.

IMPROVED MARKETING METHODS FOR SHEEP AND CATTLE

Advisory programs to improve the efficiency of sheep and cattle marketing continue to have high priority. The broad aims are to develop stock selling systems that convey consumer requirements to producers and reward efficient producers; to improve animal handling and meat quality; and to allow buyers and sellers ready access to marketing systems that encourage efficient pricing and movement of stock.

Current emphasis is on assisting new State and national marketing initiatives and

incorporating improved animal handling techniques into these programs. Highlights of the program in 1986-87 were:

- Developmental sales for CALM commenced in November, 1986, with \$13 million of stock being traded in the first seven months. The Department is helping CALM to enter full commercial operation by July 1987. Departmental officers assisted with training courses for livestock assessors, production of user manuals and running field days for growers. Officers also continued to serve on industry working parties for store stock trading.
- Several carcase yield 'bone-out' demonstrations were conducted with cattle to develop awareness of the benefits of price grid trading.
- The steer assessment competition organised at the Royal Agricultural Society steer show was expanded in 1987 to include a demonstration for schools and a special assessment competition for school children.
- Livestock officers and market reporters cooperated in testing the new AUSMEAT language for saleyard reporting, at seven NSW centres.

BEEF

Murray Grey project, Japan

The Department and the Tokyo Metropolitan Government are running a joint growth/carcase trial to compare the performance of Japanese Wagyu, Holstein-Friesian and Murray Grey breeds of beef cattle. This activity results from a previous technical visit to Japan by two departmental beef cattle officers. The Australian Murray Grey Breed Society is promoting the trial, as the breed dominates the current live cattle trade with Japan.

The Minister presented six Murray Grey steers to the Tokyo Metropolitan Government on 1 October 1986 to mark the formal commencement of the project. A beef cattle officer accompanied the steers to Japan to initiate trial protocol and will return for completion of the project in November 1987.

Crossbreeding

Fifteen years of intensive crossbreeding research at the Agricultural Research and Advisory Centre, Grafton, is now paying dividends. As a result of the advisory campaign to encourage crossbreeding as a



The Minister for Agriculture, Lands and Forests, Mr Jack Hallam (right), and the President of the Murray Beef Cattle Society (centre) presented six Murray Grey steers to the Tokyo Metropolitan Government this year. The steers are part of a 12-month growth/carcase trial that will compare their performance with that of traditional Japanese cattle. Accepting the steers is Mr Yasuhiko Tanaka (left), Senior Consul with the Japanese Consulate-General in Sydney.

means of improving performance, an estimated 30% of the State's cow herd is now crossbred (15% in 1982) and about half NSW beef producers are involved, to some extent, in crossbreeding.

The Grafton program found that on low-quality pastures, net annual return for a British Breed herd could be lifted by 35% following the introduction of a crossbreeding program. On medium-quality pastures, the improvement was over 20%.

Grow-out trials, in which more than 2000 steers were run under differing environments in commercial conditions at 26 locations, have enabled recommendations on the optimal breed selection for a crossbreeding program. Results showed that if the average annual liveweight gain for purebred British breed steers was less than 0.6 kg per day, then crossbreeding with *Bos indicus* was best; if more than 0.6 kg per day, then growers should use European breeds in the crossbreeding program.

Further studies showed that consumers could detect no difference in palatability and eating quality between crossbred and pure Hereford meat.

To determine whether production per hectare from crossbred cows was lower than that from purebred cows, the Department's Grafton group studied pasture intake by 280 first-cross and purebred cows over a 12-month period. This was the largest study of its kind ever attempted by the Department. The results clearly demonstrated that crossbred cows on pasture were more productive than purebred cows, even after allowing for increased feed intake by the crossbred animals.

The studies also showed that considerable production advantage could result from designing a breeding program to match peak pasture production with peak animal requirements (lactation).

F1 sales. A further development in the adoption of crossbreeding was reached with the first F1 sale, held at Glen Innes in May 1987.

All cattle were inspected before the sale by a departmental beef cattle officer and a representative of the sale committee for soundness and for 'being as described' in the catalogue. In-calf females had to be accompanied by a veterinary certificate, arranged by the vendor. Sale results were

good and, significantly, meat buyers could not afford to compete with restockers.

Victorian weaner grow-out. A significant extension of the Grafton Crossbreeding Project was the start of a commercial weaner grow-out trial/demonstration in Victoria. This project is being conducted jointly by the NSW Department of Agriculture and the Victorian Department of Agriculture and Rural Affairs. It involves steer weaners bred on the north coast of NSW, representing six genotypes:

British breed	—Hereford
British × British breed	—Hereford × Angus
Crossbred (F1)	—Brahman × Hereford
Backcross	—Hereford × (Brahman × Hereford)
Outcross	—Angus × (Brahman × Hereford)
Derived breed	—Braford

The cattle were selected and purchased in April 1987 and are currently being grown out in Victoria under two different management regimes—feedlot and pasture. The project will continue for three years.

Growth rate

The selection trial at Trangie now includes selections based on efficiency of feed utilisation as well as those based on growth rate. Indications are that the faster growing cattle are more efficient producers of beef, despite higher feed intake. The success of the trial has led to the establishment of a satellite herd at Glen Innes, to test performance of the lines in a different environment.

The data are being analysed simultaneously with those from large selection lines maintained by the US Department of Agriculture at Clay Centre, Nebraska, to give immediate comparisons of actual responses to selection within the different populations.

Initial results suggest that selection for increased growth rate has no adverse effect on age of puberty in heifers or on calving and weaning rates. There appears to be little difference in milk production between cows from each selection line.

Muscle evaluation

Bone-out demonstrations conducted by departmental officers suggest that variations in muscling may have much greater effects on

yield of saleable meat than was previously thought. These effects have been studied to assess their impact on saleyard prices.

Lotfeeding

There has been a statewide increase in demand for information on lotfeeding of beef cattle, reflected in the higher Australian throughput (37.5%) of feedlot cattle this year to a total 108 774 head. Departmental beef cattle officers have responded to this with on-farm advice, group activities and publication of technical material.

The increase in lotfeeding reflects the favourable relationship between the price of store cattle, fat cattle and feeder grains, and trade promotion of quality beef.

Breedplan/Group Breedplan

Departmental officers at the Animal Genetics and Breeding Unit (AGBU), University of New England, contributed to the further development of Breedplan and Group Breedplan—systems for genetic evaluation of beef cattle within and across herds. Group Breedplan, which allows the genetic merit of individual animals from different herds and different physical and management environments to be compared, was introduced this year.

Group Breedplan reports have now been published for the Angus, Poll Hereford and Simmental breeds. These reports have identified trait leaders for 200-day weight (milk and growth), yearling weight (about 400 days) and final weight (about 600 days).

The Department of Agriculture, the Australian Meat and Livestock Research and Development Corporation and the University of New England signed a joint ownership agreement and licensed the University's Agricultural Business Research Institute to operate both systems within Australia and to market them internationally.

A training package for producers, students and advisory officers has been mounted on computer disc and is being sold in Australia and overseas.

Cattle handling and transport

Increased emphasis in the Department's advisory work on cattle handling was aimed at improving both meat quality and the wellbeing of the animals.

A beef handling and transport working party produced three display boards and

accompanying information notes, which were used at three field days together with displays on yard design. By this means, departmental beef advisers emphasised to producers the main considerations when designing facilities, handling stock, and preparing stock for transport.

DEER FARMING

Continued growth of the deer farming industry in NSW has seen an escalation in demand for information. Significantly, this increase has been shown by commercial farmers wishing to diversify.

The main limitation on growth of the deer industry is the shortage of breeding stock: demand has forced prices for fallow breeding does to \$1,000 per head and more. Prices for other species have increased accordingly.

Live deer imports were curtailed following quarantine problems, but revised procedures will allow early resumption of imports.

An estimated 15 000 head of deer are now being farmed in NSW, out of an Australian total of 42 000 on 400 farms. Deer slaughterings in NSW have reached almost 1000 head for 1986–87, but this still supplies only 20% of the total State market for venison.

Venison

Venison marketing in NSW has undergone major changes since the opening of Australia's first deer-only abattoir in early 1986. The traditional markets within the restaurant industry have expanded and new outlets for venison have opened up through several large Sydney supermarkets. Market development has seen such products as venison sausages, salamis, mince, and venison 'ham' steaks also being sold.

The Department's Primary Products Promotion Unit produced and promoted recipes for venison, with emphasis on the local product.

Velvet

A small but growing velvet antler industry is developing within NSW, with most velvet antler being processed before export to Taiwan, Japan and Korea. There is also a market for velvet antler within the Asian community in Australia. Market development is restricted by low supplies, as most deer farmers prefer not to harvest velvet antler but to remove antlers once calcified.



Scrupulous attention to hygiene is just one of several aspects of good milking management being promoted in the Department's mastitis advisory program launched this year. The Department's work in this field has helped save the industry at least \$6 million a year.

Liaison

The Department produced a video, *Introduction to Deer Farming*, in association with the Deer Industry. This is being used within NSW and interstate, and there have been enquiries from overseas.

In recognition of the Department's contribution to the industry, the NSW Deer Breeders' Association has appointed the Department's deer specialist as an *ex-officio* member of their council executive.

DAIRYING

Marketing arrangements

The introduction of new national marketing arrangements in July 1986 and a compositional payment scheme in NSW in January 1987 were the most significant changes made in milk marketing for many years. The introduction of compositional payment for milk supplied for liquid consumption had been strenuously advocated by the Department for many years, and fulfilled a Government commitment made to the industry in 1982.

The Department submitted recommendations to the Standing Committee on Agriculture, the NSW Department of Health and the National Health and Medical Research Council (NH&MRC) to change the NH&MRC Regulation for Milk and Milk Products to enable market milk to be standardised under certain conditions, and to replace the outmoded requirements of testing for solids-not-fat with a test for protein.

Dairy cattle nutrition and management

Two computer programs were written to enable dairy farmers to incorporate an accurate system of fodder budgeting in their present farm management programs, and to isolate costs of producing milk from other variable costs of production. The programs, Feed Plan and Milk Cost, are part of the comprehensive dairying package Milnomics being developed by the Department.

The Department also purchased the Camdairy computer model developed by the University of Sydney. Use of this package by large dairies in the Cumberland district and of Feed Plan and Milk Cost in other districts will enable farmers throughout NSW to identify areas in which costs of production can be reduced.

Because the development of computer models is so important to the industry, the Department conducted a workshop for

personnel from the Queensland Department of Primary Industries, Victorian Department of Agriculture and Rural Affairs and the WA Department of Agriculture to consider the application of a large-scale model being developed by officers from WA with funds provided by the Dairy Research Council. The workshop established a close working relationship between officers from these States working on the development of such models.

Research continued at the North Coast Agricultural Institute, Wollongbar, on the protein requirements of the grazing cow. During the year, the effects of pasture and grain supplements on the composition of milk were studied, particularly in relation to protein content. The results show that the protein level is influenced greatly by the type of pasture grazed by the cows and (contrary to popular belief) feeding of grain is not a reliable method of increasing milk protein.

In a separate study, the effect on milk production of feeding various commercially available protein meals was examined. When cows were fed supplements of protected cottonseed meal and formaldehyde-treated sunflower meal, increased production of up to 2 litres of milk per kilogram of supplement were recorded.

Herd improvement and reproduction

The Department developed computer packages to help farmers determine the economic returns from using semen from dairy bulls, based on their breeding values and the cost of semen, and to assess the effects of the new system of compositional payment on their financial returns. Videos were produced on the new reproductive/health package (which is part of the new herd recording system) and on detecting cows on heat. A technical bulletin on the various components of the Australian Dairy Herd Improvement Scheme was produced and distributed to all States.

The following research programs relating to dairy herd improvement were carried out at AGBU, Armidale:

- Development of new genetic evaluation systems for ease of calving and for survival of sires' daughters. The latter system leads the world in the application of non-linear evaluation to this vital area of sire selection. It incorporates genetic principles into a program originally developed for failure analysis of aircraft components.

- Evaluation of options for the measurement of genetic determinants of milk yield and composition. These will be used in the calculation of Australian Breeding Values for sires and cows.
- Initiation of a project to detect genetically inferior bulls prior to progeny testing. Early results from this work have been very encouraging and the new method may replace progeny testing as a means of selecting young bulls for use in artificial breeding centres.

Dairy Herd Improvement program. There were two main developments:

- Introduction of a new computerised herd recording system for operation on the Department's Prime computer. This new system allows greater flexibility in the handling and processing of data, more rapid dissemination of information to farmers, and for the eventual automatic transfer of data from central testing laboratories throughout the State to the Prime computer.
- A change in management structure of the Department's artificial breeding centre at Graham Park Breeding Services, Berry, by the appointment of a Manager, Artificial Breeding Services, with specific expertise in marketing. This will improve commercial operations of the service.

Milking management

The average somatic cell count of the State's dairy herd has been reduced from 800 000 SCC/mL to below 400 000 over 12 years. This has resulted in an estimated net saving to the industry of at least \$6 million per year.

This program has enabled a rejection standard to be introduced by the NSW Dairy Corporation based on a maximum of 1 000 000 SCC/mL. This is the first such standard to be introduced in any State in Australia.

The statewide Bulk Milk Cell Count Competition, which is a measure of the incidence of mastitis in dairy herds, was again conducted by the Department in conjunction with Beechams Veterinary Products, the NSW Dairy Farmers Association and the NSW Dairy Corporation. For the second successive year the winner was K. R. Whatman of Kangaloon, with an average count of 58 000 for the year. The winner of the Large Herd Award (over

150 cows) was J. Hall of Finley with a cell count of 109 000 for a herd of 157 milkers.

Eighteen dairy farmers achieved counts of less than 100 000, thereby qualifying for the 100 Club, another section of the competition.

A milking machine testing and training facility was established at the John Macarthur Agricultural Institute near Camden so that officers and technicians can be trained in testing milking machines.

Automated dairying

Automation in the dairy shed came a step closer following the purchase of a computerised identification, milk recording, feeding and management unit at the Bega Dairy Demonstration Farm. The system was purchased from income generated on the farm. The cost of the system is too high for use on commercial farms at present, but the unit (which was imported from Holland) was introduced to demonstrate the potential of technology that will undoubtedly be used in the future.

GOATS

Goat numbers continue to increase, with NSW maintaining its position as Australia's largest producer. In response to this continuing growth and to favourable market prospects for goat products, especially mohair and cashmere, the Department of Agriculture took some important initiatives during 1986-87.

One of these was formation of the Goat Industry Development Unit (GIDU). The unit comprises advisory and research officers, a veterinary officer and two economists. Its objectives are to increase the number of goats in NSW, to improve marketing and to increase productivity. Since its inception, GIDU has received support from all sectors of the industry.

Further to this, a Goat Industry Development Council was formed under the leadership of the Department, with membership from the industry and from Government. Its objectives are to encourage commercial development and investment in the goat industry, with particular reference to available markets.

Cashmere preparation workshops were held in the main producing areas to teach local growers specific skills in cashmere production. The workshops were designed by GIDU with the cooperation of the Australian

Cashmere Marketing Corporation and have been well received by cashmere growers.

To expand and improve advisory services to producers, 20 departmental livestock officers were given intensive training in goat production during 1986–87.

Dairy goats

During 1986–87, the Department assisted the dairy goat industry in various ways:

- preparation of performance specifications for goat milking machines;
- completion of a series of workshops on goat's milk quality control;
- production of the *General Code of Hygienic Practice for the Goats Milk Industry*, and a model for self-regulation;
- compilation and distribution of *Dairy Goat Notes*, the departmental newsletter to the industry;
- establishment of the NSW Goats Milk Study Group.

Research

Research into the fleece and growth characteristics of Australian feral goats has produced the first full set of phenotypic and genotypic parameters for goats in the world. This information is now being used to devise selection systems for goat breeding, using multistage selection indices. Selection systems have been developed for several breeders and the required relationships have been tabulated to assist goat breeders who wish to design breeding schemes to meet their specific objectives.

Collaborative work with the CSIRO and the Queensland Department of Primary Industries produced a technique for attaining three fleece growth cycles every two years. Research continued into improving reproductive performance of goats in Thailand under the Thai-Australian Prince of Songkla University Project. The modified artificial breeding procedure developed from these studies can be used in other projects.

LIVESTOCK REGULATORY SERVICES

Registration of Stock Brands Act 1921

The Large Stock Brand register contains about 165 000 entries, with many brands being used by persons other than the registered proprietors, and others that have become redundant because the proprietors have died or left their properties.

Following reviews to ascertain the extent of the problem and possible procedures to bring it under control, a committee was formed in June 1986. The committee (comprising representatives from Pastures Protection Boards, the Police Department and the Department of Agriculture) investigated the problem in consultation with industry groups such as the Australian Jockey Club, the NSW Farmers Association, the Cattlemens Union and the NSW Dairy Farmers Association.

The Committee has now completed its task and has made recommendations to the Minister that Cabinet consider changes with the following objectives:

- better regulation of branding of horses and cattle;
- introduction of procedures for ear-marking of cattle and deer, and ear-tattooing and freeze-branding of cattle;
- allowing owners of registered brands to brand stock to denote legal ownership of those stock;
- transfer of responsibility for the schemes from the registrar to secretaries of Pastures Protection Boards.

Vertebrate pests

Rabbits. A statewide campaign to inform landholders and government authorities about rabbit damage and control was launched and consolidated. Consisting of display boards, videos and publications, the program reached a large audience through exposure at major field days and local shows.

Wild dogs. Following review of the wild dog control program, seven meetings were held in tableland areas. All recommendations arising from the review have now been implemented, resulting in aerial control programs being fully coordinated for the first time. The meetings also increased landholders' understanding of research into wild dog control, 1080 toxicology and its impact on non-target species, and the need for the coordination of control programs.

A wild dog meat-baiting trial showed that most baits were taken within the first week after placement and that the simple act of covering baits may prevent large birds taking or moving them. There was evidence that a wild dog will eat more than one bait along a bait trail, which has implications for bait placement.

Feral pigs. Culling from helicopters is being used increasingly to control feral pigs, with annual shoots now conducted in eight Pastures Protection Board districts. A national workshop on helicopter culling of vertebrate pests was led by the Special Livestock Officer (Vertebrate Pests).

Night vision equipment was purchased to carry out behaviour studies at traps and bait stations aimed at improving the effectiveness of control strategies. A large-scale poisoning program at Namadgi National Park reduced the feral pig population by over 90%.

NATURAL DISASTERS RELIEF

During the year many parts of the State experienced drought, bushfires and flooding. With the assistance of Pastures Protection Boards, the Department administered the certification and payment of subsidies amounting to 50% of costs for road transport on movements of water, fodder and livestock.

Up to 50 of the State's 57 Pastures Protection Districts were drought-declared at some time during the year. Expenditure on drought relief road transport subsidies was \$5,284,144.

The Government (Rural) Agencies Sections of the State Bank of NSW also provided loan assistance to producers affected by these natural disasters and other climatic adversities. Expenditure on this assistance was \$7,749,923.

Pastures protection. The State's 57 Pastures Protection Boards are responsible for, among other things, administration of noxious animal control.

The Pastures Protection Act was amended to provide for abolition of the Wild Dog Control Boards, and Pastures Protection Boards took over the duties of Wild Dog Control Boards as from 1 January 1987.

Also from January 1987, Pastures Protection Boards began to use the accrual accounting method of financial control, instead of the cash accounting method used until 1986. The change to the new system, made at the request of the Parliamentary Public Accounts Committee, will provide more comprehensive information on Board finances.

Apiaries Act 1985

The revised Apiaries Act is now fully implemented and has been readily accepted by industry. The legislation has already been invoked with the first prosecution resulting in a beekeeper being fined \$500 with \$101 court costs. The offence was exposing diseased hives and material to robber bees, for which the maximum fine is \$2000.

This conviction, combined with widespread publicity for the amended legislation, has seen a significant increase in the number of new applications for bee registration. There were 650 during the first twelve months, with the State total now 4713 beekeepers owning 260 000 hives.

Registration procedures were updated using a new computer program developed for the purpose. The program also records and monitors bee disease outbreaks and compensation claims where there have been outbreaks of American foulbrood disease. The program will be of significant benefit to officers in disease control and irradiation programs.

Apiary inspections revealed 88 disease outbreaks of American brood disease involving 1064 hives.

ANIMAL WELFARE

Legislation

Amendments have been made to the regulations on identification of cattle. The definition of a registered brand has been extended to include freeze brand, ear tattoo and earmark as well as firebrand. This broadens the scope for legal marks with the dual benefit of improving the welfare of stock and increasing the value of hides.

Legislative aspects of animal welfare are contained in the Veterinary Surgeons Act 1986 (which came into force in March 1987), the Prevention of Cruelty to Animals Act 1979 (as amended during the year) and the Animal Research Act 1985. This last Act will come into effect when the Regulations are finalised and will control all aspects of the use of animals in research, experimentation or education.

In accordance with this Act, the Department has established 14 Animal Experimentation Ethics Committees to appraise all research projects that use animals and involve the Department. Many such projects have specific animal welfare objectives or implications.

Research

Techniques developed by the Department are being used to measure the level of stress experienced by stock subjected to routine on-farm practices.

Current work shows that surgical procedures on lambs result in a rapid rise in the level of cortisol, which returns to normal within 24 hours. This indicates that lambs are exposed to short-term acute stress. However a corresponding rise occurs with B-endorphin, which has a pain relieving action.

Another project, at Warren, is examining the growing practice of grinding the teeth of sheep and results will be assessed in conjunction with a large project run by the Australian Wool Corporation.

Eventually, this work will enable sound assessment of the relative merit of existing practices and proposed alternatives.

Similar evaluations are proposed for cattle handling practices. These techniques will be developed further for use in assessing stress during transport and prior to slaughter. A draft recording data sheet was produced and used on three recent occasions when stock from the Department's Crossbreeding

Research Program were slaughtered.

Information such as time spent on transport and cattle behaviour will be used to identify problems affecting welfare and meat quality during the farm to slaughter phase of meat production.

Advisory

Departmental officers issued guidelines for handling, housing and transportation of livestock. Many of the Codes of Practice on livestock issues have identified problems inherent in current practices, which need to be resolved.

A newsletter now advises departmental officers and industry on current issues concerning the handling and transport of livestock. Officers also presented papers at several conferences and seminars held during the year.

Trends in commercial systems and alternative housing and equipment for layers in Europe were examined recently. Although aimed at improving welfare, many such systems have developed new welfare-related problems.

As part of an increased emphasis on animal welfare, the Department issued guidelines for handling, housing and transporting livestock.



INTENSIVE ANIMAL INDUSTRIES

APICULTURE

Lucerne pollination

As part of a crop pollination program, work at Trangie demonstrated dramatic increases in seed yields of lucerne when bee numbers were increased. Yields of lucerne seed increased from 700 to 1100 kg/ha when hive numbers were increased from 5/ha to 10/ha. Average commercial seed yield in NSW is only 250 kg/ha, demonstrating the need for an increase in the number of hives per hectare. The lucerne industry is worth \$120 million to agriculture, with the seed industry valued at \$25 million p.a. These figures have been publicised in the advisory program, resulting in a marked increase in demand for honeybees for pollinating lucerne crops.

Sunflower pollination

Over the past three years, trials have evaluated sunflower cultivars for their ability to produce seed with or without pollination by bees. Results show a variation between cultivars in their ability to produce seed in the absence of honeybees. A stocking rate of one hive of honeybees to the hectare has resulted in yield increases ranging from 33.4% to 167%. At 25 000 plants/ha, and assuming a farm-gate price of \$220/t for sunflower seed, this would mean an increased return of \$134/ha for Hysun 33, for an added cost of \$30 for the hive of honeybees.

Genetic improvement

In a project to improve honey production and demonstrate to producers the value of following a planned stock improvement program, ten cooperating beekeepers were supplied with artificially inseminated queen bees for evaluation.

Advisory

About 250 people attended the Annual Beekeepers Field Day conducted by the Department at C. B. Alexander Agricultural College, Paterson. The beekeeping display at Mudgee Small Farms Field Day attracted 1000 visitors.

An apiculture correspondence course is now offered through C. B. Alexander College. So far, 80 applications have been received for the course.

Protein analysis of pollens in northern NSW

Over the past two years the Department analysed 40 pollen samples for crude protein and amino-acid levels. This work has identified the factors that limit nutritional value of pollens. The main problems are the low crude protein and low *Iso-lucien* levels of many pollens harvested by bees.

Industry developments

Trial shipments of honeybee queens were sent to Canada, a new venture that could open up a \$2 million market to NSW. Before this, Canada had banned the importation of honeybees from Australia. It is hoped that other overseas markets will also be found as a result of Australia's relatively disease-free apiculture industry.

Diagnostic

All five of the Department's regional veterinary laboratories continued to provide a bacterial diagnostic service to the industry. Pests and parasites are identified at the Biological and Chemical Research Institute (BCRI), Rydalmere. These services make a major contribution to protecting the health of honeybees.

PIGS

Boar Performance Test Station

The Department's Boar Performance Test Station was established in 1985 at C. B. Alexander College, as part of a program to improve pig management. About 340 boars were tested for daily weight gain, backfat, and feed conversion ratio during the year.

Pig breeders from Queensland and Victoria have also supported the program, and two high-scoring boars were placed at the Darling Downs Artificial Breeding Centre.

One Landrace boar grew at 1334 g/day, had a feed conversion ratio of 2.05 and a backfat of 11 mm with an index of 282 points. This is the best performance since the station opened. The boar was sold to industry for \$2,000. Boars scoring above an index of 215 points are selling for \$700 to \$1,000.

Boars from the station have been well accepted by the industry. At the National Pig Fair at Gunnedah, tested boars averaged \$865 compared with an average price of \$600 for untested stud pigs. There has been a heavy demand for testing places in recent

months, as boars passing test will be offered for sale at the NSW Pork and Bacon Fair at Lismore in July 1987.

District officers concentrated on the 'Go for Growth' component of the Improved Pig Management Advisory Program for the second year of the 10-year program. The best producers in NSW are now achieving the program target of 595 g growth per day for all growing pigs, which is ahead of schedule. Some results are outstanding, with improvements of 100 g per day, an increase of more than 20%.

The industry has, largely because of the publicity generated by the NSW Boar Performance Test Station, become much more aware of the value of independent assessment of breeding stock. The introduction of high-testing boars from C. B. Alexander College and the Department's on-farm testing program have been the main reasons for improved growth rates in the pig industry.

Least-cost diet service

The Department's computerised least-cost diet program produced more than 500 diets during the year for producers who mix their own feed. Producers who use the service have found that the diets reduce costs, improve pig performance and carcase quality, and increase their awareness of alternative feeds. Pigs fed on diets formulated by the least-cost diet service have won major prizes at carcase competitions.

Livestock judging

The Department helped the Australian Stud Pig Breeders to run a series of statewide judging competitions which were well supported by agricultural students and farmers. At these competitions, departmental officers emphasised the need for genetic improvement through on-farm testing.

Piggy Bank

The farm management recording scheme 'Piggy Bank' continued, with 85 producers enrolled from across the State. One participating producer improved performance in grower pigs from 390 g/day to 600 g/day in three years. Some herds have achieved increases of four extra pigs sold per sow per year. Piggy Bank is proving to be a valuable aid to the industry in improving performance.

Pig Research Liaison Committee

A Pig Research Liaison Committee was formed at Wollongbar during the year with representation from producers and from departmental research, advisory and administration staff. At its first meeting in March 1987, it was agreed that research on grower pigs should continue, with possible expansion of activities into sow nutrition and product quality.

Amino acids

While it has been well established that low availability of the essential amino acid lysine can be a problem, departmental research now shows that low availability can also be a problem with the amino acids threonine, methionine and tryptophan. Future work will define the actual availabilities of these amino acids in the main protein concentrates, and reasons for any reduction in availability.

POULTRY

The Department of Agriculture has one livestock officer working in the poultry meat industry and four working as advisers to the egg industry. There are four major advisory programs in progress:

Poultry meat

Under the Poultry Meat Industry Act 1987, a Poultry Meat Industry Committee (PMIC) has been established. It consists of six representatives of poultry processors, six representatives of poultry growers, a consumer representative and a departmental chairperson and secretary.

About 90% of meat chickens and turkeys in NSW are grown by family farmers under contract to several large processors. The contract growing fee is determined by the PMIC according to specific guidelines and a cost-of-production model.

Departmental officers helped develop the guidelines for contract growing and update the economic model to ensure that efficiency is encouraged and rewarded. Growth rates in the chicken meat industry now average 2 kg liveweight at 47 days of age with a feed conversion ratio of 2.1 kg feed eaten per 1 kg bodyweight produced.

In addition to servicing the Poultry Meat Industry Committee, the Department is concentrating its advisory effort in two strategic areas:

- **Litter materials.** The Department is evaluating wood shavings and alternative materials for use as floor litter on which to raise chickens. Some by-products of timber milling were found to be contaminated with chemicals. Studies by the Department and the Forestry Commission found that, although residue levels in the meat, fat and livers of chickens raised on these materials were low, a potential problem exists. Growers were advised not to use sawdust or shavings from imported timbers, or from timbers treated with copper-chrome-arsenate compound. Other materials being considered include rice hulls, shredded paper, straw, and wood shavings produced specifically for the purpose.

- **Goose production.** The Department is encouraging the development of commercial production of geese. The second national workshop for goose producers, held at Port Macquarie in 1987, attracted more than 60 growers. This newly emerging industry faces significant problems in both production and marketing. With the Department's assistance, growers formed the Australian Commercial Goose Producers Association to facilitate the exchange of technical information and the proposed importation of superior genetic stock.

Following a study tour to the UK by a departmental livestock officer in April 1987,

The Boar Performance Test Station tested about 340 boars this year for daily weight gain, backfat and feed conversion ratio. Other programs assisting the industry include formulation of least-cost diets and management to improve performance in grower pigs.



an advisory program was developed to help NSW growers to improve the reproductive efficiency and growth rate of their geese through the application of genetic selection, regulated lighting of breeding stock, new incubation techniques, and improved nutrition, housing and husbandry.

Layer farm management

Within its Egg-o-Nomics program, the Department conducts the National Farm Management Recording Scheme (NFMRS), the NSW Random Sample Layer Test (RSLT) and a series of Local Consensus Data (LCD) studies.

The RSLT provides a standard for comparison of performance of birds of the same strain and age on commercial farms.

The NFMRS measures the physical and economic performance of commercial flocks as a basis for farm planning and decision making.

The LCD studies provide whole-farm economic models for flocks of 10 000, 30 000 and 60 000 layers. These models measure the impact of changes in production or economics on returns to capital.

In 1987, 68 flocks were recorded in the NFMRS, 17 commercial strains were recorded in the RSLT, and three groups of farmers (six to eight in each group) participated in LCD studies. Reports published on each of these activities contained information of value to the industry as a whole.

Through comparative analysis of data from these three sources it has been possible to identify some of the major factors limiting the efficiency of egg production in NSW. This has provided the basis for the Department's advisory programs in the egg industry.

Layer housing

A survey in 1985 collected information on the type, age and operation of poultry houses in NSW to provide a measure of future progress. The survey revealed that 60% of egg producers were using old sawtooth sheds in which it is extremely difficult to regulate temperature. Less than 12% of producers were recording daily shed temperatures and less than 5% were able to achieve the optimum temperature range of 20° to 28°C in their layer houses throughout the year.

Sub-optimum temperatures increase feed intake and feed costs, but high temperatures

depress feed intake, egg size and production. Together these factors add 5c to the cost of each dozen eggs produced in many poultry houses.

The Department's Envir-o-Lay program helps farmers to monitor environmental temperatures and prepare budgets for upgrading or replacing existing facilities. As a result of the program, many farmers have installed adjustable blinds, ridge aperture controls, fans and fogger sprays in their poultry houses in an effort to regulate temperature. Economic conditions have discouraged most farmers from replacing their poultry houses with buildings of superior design.

Layer nutrition

The Department used computerised least-cost programs to formulate more than 500 poultry diets for farmers during 1986-87. It also analysed 350 ingredients of stockfeeds and formulated diets in support of its nutrition advisory program.

Although feed accounts for 60% of total farm egg production costs, a survey conducted by the Department in 1985 found that less than 20% of egg producers in NSW were accurately measuring and recording the feed consumption of their flocks, and less than 50% were making seasonal adjustments to diets.

Feed wastage and poor feeding practices increase the cost of egg production by up to 4c a dozen. Overconsumption of nutrients in winter and underconsumption in summer adds a further 2c per dozen to production costs on many farms.

The Department's Feed-n-Lay program has improved the efficiency of feeding for egg production in that more farmers are now measuring and recording daily feed intake, and adjusting poultry diet formulations according to the feed intake and egg-mass production of their flocks.

National coordination

The national character of the Australian poultry industry is reflected in the growing influence of the Chicken Meat and Poultry Research Councils, the Australian Chicken Growers Association, the Australian Egg Marketing Council and the Australian Council of Egg Producers.

In 1986 the Standing Committee on Agriculture established a group to assist

national coordination of poultry research and advisory services. The group consists of representatives of each State Department of Agriculture and the Commonwealth Department of Primary Industry. Since its formation the group has held a national planning meeting; supported the National Farm Management Recording Scheme (Eggs); obtained industry funds for a national

program to upgrade the standard of poultry housing; acted to expand the Australian Bibliography of Agriculture (ABOA) to meet the needs of the Australian poultry industry; organised three joint seminars; and started production of national handbooks and information kits. This coordination will ensure that expertise and other resources are used more effectively and efficiently.

ANIMAL HEALTH SERVICES

LIVESTOCK HEALTH PROGRAMS

Sheep health

Drenchplan. This program, launched in southern NSW, aims at reducing the onset of resistance to drenches currently used to control internal parasites in sheep. Strategies are as follows:

- reduce the number of adult sheep drenches to two per year;
- give the full recommended dose;
- weigh sheep to ensure accurate dosage;
- change drench types in slow rotation;
- use 'low-worm' pastures after drenching;
- get an accurate diagnosis before drenching sheep.

A number of flocks are being monitored to assess the impact of Drenchplan. To date, this program is adequately controlling internal parasites, but the reduced frequency of drenching is putting more pressure on the effectiveness of existing drenches and there are some problems with drench resistance. The program is well accepted by sheep owners.

Wormkill. Wormkill is a strategic drenching program for internal parasites in sheep on the northern tablelands and slopes. In the standard Wormkill program recommended to sheep producers in July 1984, adult sheep were treated three times and lambs twice with Seponver®. These treatments were strategically timed and aimed at controlling barber's pole worm (*Haemonchus contortus*).

The early spring treatment (pre-lambing) was aimed at minimising worm burdens arising from pick-up of infective larvae that had overwintered in the pasture.

Results of monitoring over a two-year period indicated that overwintered larvae were at a minimum on farms that had applied Wormkill correctly for two years, which meant the spring treatment was unnecessary.

Wormkill 2, in which Seponver treatments were limited to November and February in all classes of sheep, was launched in 1986. Producers were encouraged to use Wormkill 2 only if they had used Wormkill for a full two years on all sheep on their property. The level of control of barber's pole worm is still monitored on commercial properties using Wormkill and Wormkill 2.

Although Wormkill was designed to control only roundworm parasites, it is also effective against liverfluke. By adding a fluke treatment in April, the estimated 15 to 30% of producers who consider fluke to be a serious problem were able to control both roundworms and liverfluke. Where such producers graduated to Wormkill 2 it was necessary to have a second flukicide treatment in early spring.

Farms have a special fluke problem if most of the grazing area is contaminated. A research project was established in 1986-87 on a commercial property where sheep were confined to areas uniformly infested with fluke. Limited but strategically timed treatments with Fasinex® were given in September, February and April, together with a November Seponver treatment for barber's pole worm. Fasinex is very effective against immature liverfluke. In the long term, this field research should lower pasture contamination to a level whereby fluke treatments may be reduced. Monitoring on the research property indicates a much greater level of fluke control with an increase in general sheep health and no losses from fluke in 1986-87.

Resistant populations of black scour worm (*Trichostrongylus colubriformis*) and brown stomach worm (*Ostertagia circumcincta*) are very common on the northern tablelands. On several properties, these populations are resistant to both major groups of broad-

spectrum anthelmintics. Where resistance is established, control of these internal parasites by use of drenches alone is unlikely to be effective. Wormkill 2 therefore encourages producers to control resistant parasites with the help of pasture management. A joint CSIRO/Department of Agriculture research project is investigating the effectiveness of various combinations of grazing management in reducing pasture contamination and assessing the impact of such practices on control of resistant roundworm parasites.

Resistance of external parasites to insecticides. Development of insecticide resistance continues to threaten effective chemical control of external parasites. Sheep blowfly has become resistant to organophosphate and carbamate insecticides, resulting in control problems. Research at BCRI has determined the frequency and level of resistance in field populations of the blowfly, isolated and synthesised strains of known resistant genotypes, and assessed the impact of resistance on field control. This work confirms that there has been no change in resistance of sheep blowfly to Vetrazin®, the insecticide used for control of this pest.

Reported failures of synthetic pyrethroid insecticides to control sheep body louse have caused considerable concern to the wool industry. Entomologists at BCRI are currently developing new *in vitro* and *in vivo* techniques to determine whether sheep body louse has developed resistance to these widely used compounds.

Licekill. This program was launched in late 1986 to coincide with the change in policy on sheep lice control in NSW and the withdrawal from use of arsenic-based sheep dips. The program was developed jointly by the Department of Agriculture, Pastures Protection Boards and industry groups to reduce the prevalence of lice in NSW sheep flocks.

Licekill has changed the emphasis on lice control from a regulatory to an advisory approach: graziers who suspect lice infestations in their flock are able to seek help with no fear of regulatory action. Regulatory aspects of the program have met with general acceptance from graziers, but graziers need more encouragement to obtain professional advice on controlling lice in their flocks. Promotion of the program at field days and

through the media, however, has increased the number of enquiries concerning the need to dip sheep, the best chemical to use, and the best dipping technique. There has also been increasing interest in control of other diseases associated with dipping, e.g., dermatophilosis (lumpy wool) and post-dipping arthritis.

As part of the Licekill program, a backup service is being provided by the Veterinary Laboratories, Glenfield, and BCRI to investigate apparent dipping failures. This work is being funded by the industry and will monitor the effectiveness of both the chemicals and methods of their administration presently used in lice control.

Withdrawal of arsenic-based sheep dips.

Arsenic-based dip treatments used for controlling lice in sheep were withdrawn from sale in NSW in December 1986. This action followed increased awareness in Japan of problems caused by residues in wool-scouring liquids. Accidental ingestion of discarded arsenic dipping compounds is also a common cause of poisoning in cattle. Public information on the availability of other effective sheep dips, as well as the need to stop using arsenic, is included in the Licekill advisory program.

Ovine Brucellosis Accredited Free Flock Scheme. Ovine brucellosis is a contagious disease of rams which reduces reproductive performance. The Ovine Brucellosis Accredited Free Flock Scheme was introduced in 1981 to provide a list of ram flocks in NSW that are free from ovine brucellosis. Commercial sheep producers can now confidently purchase rams from accredited flocks, knowing they are free of the disease. The scheme is a cooperative effort between breed societies, private veterinary practitioners and the Department. Sheep industry support has continued at a very high level during the year. There are now 1044 individual sheep flocks accredited in the scheme compared with 1030 flocks 12 months ago. A significant number of studs from all breeds are represented and accredited rams are available throughout NSW.

New England Protected Area (NEPA). NEPA was established in 1960 to protect sheep flocks on the northern tablelands from footrot. The area has been progressively

enlarged to take in north-eastern NSW and now includes 5 million sheep in 5000 flocks. The number of properties quarantined for footrot within NEPA dropped from 31 at the beginning of the year to 13 in April 1987. Eradication of footrot was carried out by treatment, treatment and disposal, or complete disposal of the affected mobs.

During the year a working party examined the level of local industry support for NEPA and the implementation of policy by NEPA staff. This inquiry showed a high level of producer support for the concept and operation of NEPA. Without NEPA, footrot could become an endemic disease infecting up to 70% of flocks with consequent losses in income and increases in costs for sheep enterprises. The review highlighted staffing needs and resulted in the filling of a position that had been left vacant for some time. NEPA continues to give a positive benefit/cost return to both producers and the New England community.

Footrot advisory program. This continuing program consists of voluntary control and eradication strategies developed by field veterinary staff for individual owners. The Ournie Footrot Control Group in the Hume district made considerable progress during 1986–87 towards their objective of eradication by spring 1987.

Anthrax. Anthrax presents serious human health risks. The disease occurs in NSW in a recognised belt through the wheat and sheep zone from Queensland to the Victorian border. Losses occur mainly in sheep, cattle and pigs, but horses, dogs and humans are occasionally infected.

During the year, there were six outbreaks in sheep with 129 deaths, three outbreaks in cattle with 16 deaths, and two outbreaks in piggeries with 8 deaths. Outbreaks are controlled by compulsory vaccination and carcass disposal.

Beef cattle health

Mucosal disease project. Mucosal disease, which is caused by a virus, can reduce reproductive performance in cattle. In a field investigation of this disease, 36 herds in Region 4 were sampled. All herds tested positive and a third of them showed positive reactions in adult cattle and no reactions in young cattle. The results confirmed that the disease was widespread and had potential to spread from adult to younger cattle.

Johne's disease. Johne's disease causes chronic debilitation in cattle, sheep and goats. Mainly a disease of cattle in wetter areas, it causes scouring and loss of weight. Usually only a few cattle show signs of the disease. They become infected in the first few weeks of life, but clinical signs do not appear until from two years to old age.

The disease is much more common in Victoria and Tasmania than in NSW. Lately, Queensland authorities have become increasingly concerned at the risk of importing Johne's disease from southern States and have imposed strict controls on movement of cattle.

In 1986–87, in an endeavour to assure the Queensland authorities that Johne's disease was rare in NSW, all occurrences of Johne's disease were registered. There were 13 herds with confirmed cases of Johne's disease in NSW in 1986–87, including five herds with a previous history of the disease. For the preceding five years the figures are 47 and seven respectively.

Cobalt deficiency. Cobalt deficiency was identified in cattle grazing lush, highly improved pastures on granite soils of the New England area. Despite the apparent abundance of feed, cattle failed to thrive and were ringbarking trees.

Laboratory tests, and a treatment-response trial using several trace minerals, identified cobalt as the most limiting mineral under those pastoral conditions. The trials were done in collaboration with the Tenterfield Pastures Protection Board, Regional Veterinary Laboratory staff and the staff of CSIRO at Chiswick, Armidale. Different systems of supplementation were tested to ascertain their success and cost in overcoming the deficiency. Early results indicate a high potential return to producers for low cost of treatment—about \$10 return for 40c investment.

Dairy cattle health

Hyperthermia in cattle. This investigation commenced in January 1986 with a case of unexplained 'milk drop syndrome'. This became one of 16 cases found in central west and Illawarra areas. The most important signs were increased salivation, slobbering, rapid and difficult breathing, and raised body temperature. All cattle in the herd were affected. Hand feeding with home-grown grain was a normal practice in all herds.



LICEKILL

The new approach to sheep lice control
 Over 25% of the State's sheep are lousy, costing the industry \$36 million a year. Licekill is aimed at controlling this problem.

Get your Licekill brochure



Department of Agriculture New South Wales

LICEKILL

Licekill, the new Statewide approach to sheep lice control, was developed jointly by the Department of Agriculture, Pastures Protection Boards and industry groups to improve profits for producers.

WHY LICEKILL?

More than 25 per cent of the State's sheep flocks are lousy. This costs producers over \$36 million annually. Licekill allows you to get sound advice on lice control without fear of quarantine.

HOW LICEKILL HELPS YOU

- You no longer have to notify quarantine
- Quarantine is no longer automatic
- You can get advice on your lice control program
- Information is available on chemicals and management
- If you can't get rid of lice, we can help you find out why. We can consider at risk from known infested flocks

TREATMENTS YOU CAN USE

- Many products are available to suit your specific needs for treatment
- Short wool—2 to 3 weeks off shears
- Long wool—up to 9 months off shears
- Treatment within 6 weeks of shearing is the most effective method of eradicating lice

BASIC RULES FOR LICEKILL

- If sheep have lice, seek advice
- Plan your lice control program
- Choose a treatment suited to your flock and management
- Apply product correctly, follow instructions on the label and take time to do a good job
- Maintain stock proof boundary fences
- Treat or isolate purchased or cull sheep
- Check sheep regularly for lice
- Use any product currently registered for lice control

RESTRICTIONS STILL APPLY

- It is still illegal to permit lousy sheep to stray
- To travel stock routes
- To be put in salesyards
- Quarantine—for at least 3 months after treatment—will be imposed on flocks found to be a continuing risk to other producers



Department of Agriculture New South Wales

Publications and further information available from Pastures Protection Boards

Now that growers have major responsibility for eradicating lice from their sheep, the Department and the Pastures Protection Boards, via the Licekill program, emphasise the importance of seeking advice from their officers and from veterinary practitioners.

Laboratory testing for various infectious diseases produced negative results, but investigation of feed samples by the University of Sydney revealed significant levels of ergot of rye (*Claviceps purpurea*). The source of the problem appeared to be grain crops where ergot-infected weeds, especially ryegrass, were not controlled. A feeding trial conducted at Glenfield, where ergot was added to the diet of steers, reproduced the condition in the test animals. Veterinary staff have therefore issued warnings to dairy farmers about the hazards of using home-grown grain in rations and are advising those with the problem how best to overcome it.

Selenium deficiency in dairy cattle. Low blood selenium levels in dairy cattle are common in NSW. In a survey based on bulk milk selenium, 40 to 50% of dairy herds had low selenium levels during winter 1984.

Recent overseas research on transient infertility (long intercalving intervals, poor first-service pregnancy rates, post-calving anoestrus) and clinical and subclinical mastitis in dairy cattle has highlighted the importance of inadequate selenium levels in the increased incidence of these conditions. By supplementing the diet of animals in several NSW dairy herds with selenium pellets, significant improvements were obtained in first-service pregnancy rate and a fourfold reduction in the number of subclinical mastitis infections.

A selenium supplementation trial, funded by a grant from the Australian Dairy Research Council and involving commercial dairy herds throughout NSW, was begun in late 1986. This trial is further investigating the beneficial effects of selenium supplementation on mastitis incidence, fertility, milk production indices, and heifer growth and performance.

Enzootic bovine leucosis (EBL). Cattle herds were surveyed to establish the prevalence of enzootic bovine leucosis. The disease is responsible for significant production losses in Europe and an eradication campaign is in force in several European Community countries.

The survey found cattle testing positive to be confined to two groups: dairy cattle of several breeds in the northeastern corner of NSW and Australian Illawarra Shorthorns in the Illawarra. Discussions with industry are underway to determine the best course of action.

Citrullinaemia. The genetic disease citrullinaemia was identified in Holstein-Friesian cattle in NSW. Investigations by the Department have identified the bull Linmack Kriss King as the main carrier of this disease. Linmack Kriss King was used extensively for artificial insemination in the past and many of his offspring are at present being widely used. Possibly 50% of Australian Friesians are descendants of Linmack Kriss King. If this is so, about 4000 calves may die each year from citrullinaemia.

Embryo transfer programs conducted at the John Macarthur Agricultural Institute have confirmed citrullinaemia as a genetic disease and have confirmed another bull, Newline Kriss Commodore, as a carrier of the disease. Further embryo transfer programs will continue to test other bulls and continued research is being done in an effort to find alternative, cheaper detection tests.

Pig health

Atrophic rhinitis. Atrophic rhinitis was diagnosed in two pig herds in the Orange area and was thought to have been introduced from a South Australian piggery. The pigs showed deformities of the snout and growth rates were depressed up to 15%.

A follow-up investigation was carried out in 50 randomly selected herds and 25 additional herds which contained pigs purchased from the infected South Australian herd. Clinical evidence of infection was detected in five (6.7%) of 75 herds and laboratory examinations for the causative bacteria (toxin-producing strains of *Pasteurella multocida*) are in progress. Further monitoring of NSW herds is planned this year.

Pig health abattoir monitoring. Veterinarians and meat inspectors with the Animal Quarantine and Inspection Service, Commonwealth Department of Primary Industry, monitored the health status of slaughter pigs at five abattoirs. Routine reports of diseases were relayed to pig producers. Sufficient data have now been gathered to commence a retrospective analysis to evaluate the epidemiologic value of the data to the swine industry.

Erysipelas. Researchers at Glenfield have developed an experimental *Erysipelothrix rhusiopathiae* vaccine that has given 100%

protection against septicaemia and arthritis, the two most common signs of this disease. Commonwealth Serum Laboratories have expressed an interest in the commercial development of the vaccine. Existing vaccines available to producers do not give complete protection.

Poultry health

Chlamydiosis. Chlamydiosis is widespread in cage and aviary birds and can also cause a serious respiratory condition in humans.

Chlamydiosis was recently diagnosed for the first time in a commercial duck flock in NSW. This prompted the Department to formulate a policy for dealing with any further outbreaks in commercial poultry flocks. Affected flocks are quarantined, so that slaughter and processing of heavily infected birds is stopped and the risk of spreading the disease to poultry plant workers reduced. Following successful treatment and completion of withholding periods for the antibiotics used, quarantine is removed. The Department of Health is notified of outbreaks of chlamydiosis in commercial poultry flocks.

Infected cage and aviary birds are not quarantined but the Department of Agriculture encourages private veterinary practitioners to inform owners of susceptible species that their birds may pose a risk to human health.

Infectious laryngotracheitis. Infectious laryngotracheitis (ILT) can cause respiratory problems and death in poultry. In 1986–87 the disease spread to 21 meat chicken farms and seven layer farms in the outer Sydney Metropolitan Area—the most serious outbreak for many years.

To contain the disease, the industry commenced vaccination of meat chickens with ILT vaccine. This vaccine is less than satisfactory in that it can cause severe reactions and up to 3% mortality.

The Department of Agriculture carefully monitored this outbreak, kept the industry informed of all developments and commenced trials to assess better methods of ILT vaccination.

Fly problems. The location of most poultry farms close to or within urban areas has resulted in many complaints from residents concerning the number of flies. To overcome the problem, entomologists at BCRI

investigated fly infestations on poultry farms. The research project included studies of population dynamics of the major fly species and the role of natural predators and parasites in reducing fly numbers. In addition, the use of insecticidal techniques to control flies was assessed under field conditions, and laboratory tests were conducted to determine the effectiveness of currently registered insecticides.

Newcastle Disease vaccination. In Australia, a non-pathogenic strain of Newcastle Disease virus known as V₄ has been present in chicken flocks for at least 20 years. There are no pathogenic strains of the virus in Australia.

In the event of an outbreak of Newcastle Disease, the option to vaccinate should be available. To test the efficacy of the V₄ strain for vaccination, a Veterinary Research Officer with the Department of Agriculture went to Malaysia and exposed chickens to virulent Newcastle Disease virus. These birds came from an Australian commercial meat chicken flock that had been mass vaccinated at 11 days of age with Webster's V₄ Newcastle Disease vaccine.

Results indicated that the V₄ strain present in Australia can protect poultry against a virulent Asiatic strain of Newcastle Disease virus and therefore offers promise as a vaccine.

Meetings with industry. To foster liaison and cooperation between veterinarians who service the poultry industry and departmental veterinary officers, regular meetings are now being held. These meetings allow industry to help departmental officers plan objectives for poultry health and help to keep the Department informed of health problems in the industry.

Reticuloendotheliosis. Reticuloendotheliosis virus causes cancer in chickens. Serious outbreaks occurred in 1976 when a commercial vaccine became contaminated with this virus. Research is currently progressing at the Veterinary Laboratories, Glenfield, to determine the epidemiology of this virus and to investigate previous findings that mosquitoes may transmit the disease.

Bee health

The 1985–86 year has seen significant progress in bee disease diagnosis and

research. A training program designed to improve the diagnostic service for bee diseases was completed in all Regional Veterinary Laboratories.

Gamma radiation is successful in controlling American foulbrood (a bacterial disease of bees) and about 8000 hive boxes have been irradiated in Australia. With the opening of the first commercial gamma radiation plant in NSW and amendment of the Apiaries Act to include the option of this form of control, economic losses caused by this disease have been substantially reduced.

As a result of departmental research on the problem of contaminated feedback pollen, it is now standard practice to irradiate feedback pollen before it is fed to hives. This destroys American foulbrood disease organisms without reducing the pollen's nutritional value.

American and European foulbrood. In 1986–87, various methods of antibiotic treatment for American and European foulbrood were evaluated and techniques are being developed for the diagnosis of latent bacterial infections.

Trials to determine the effect of liquid and powder oxytetracycline preparations demonstrated that both forms of treatment are successful in delivering the antibiotic to bee larvae.

Techniques were developed to identify the strains of bacteria that cause European and American foulbrood in hives which, though infected, show no signs of disease. Recognition of these inapparent infections, and the results of the continuing work to determine the extent of them, will provide more information on the feasibility of alternative control methods.

Further research is aimed at determining the cause of deaths among queen bee larvae and pupae, and at formulating methods to reduce these losses. This will benefit the queen bee breeding industry, which is currently expanding its overseas markets.

REGULATORY PROGRAMS

Cattle tick control

Cattle tick is a parasite that transmits tick fever, which can cause high mortalities in cattle. Both cattle tick and tick fever are common in northern and eastern Queensland. Surveillance of stock movements across the border prevents introduction of ticks to NSW.

Queensland border. A review examined many aspects of border activities, including legislation on stock movements, the location of scheduled tick lines in Queensland, surveillance required in the Tenterfield section and at Wallangarra Gate and the contribution that the Brucellosis and Tuberculosis Eradication Campaign (BTEC) program should make to the funding. Most recommendations will be implemented in 1987–88.

Tick Quarantine Area. Cattle ticks in NSW are confined to the northeast corner. They are endemic within the Tick Quarantine Area where control is the major objective. A cooperative treatment program in the Currumbin Valley, a compulsory dipping program in the buffer zone along the Queensland border and a similar recommended program for the rest of the Tick Quarantine Area suppress tick populations to very low levels. Compulsory examinations of all herds after the dipping season detects infested properties, which must then undertake treatments to eradicate the infestation.

One of the worst droughts on record delayed the start of the dipping season this year by up to eight weeks. This reduced the effectiveness of the dipping program but also limited tick development and survival. With all 6453 of the herds examined, only 12 infested herds have been detected. This suppression of tick populations has eliminated outbreaks of tick fever for the last three years. The pour-on tickicide, Bayticol Pour-on®, has proved a popular alternative to dipping, especially for treatment before moving stock.

Stockowners are competent in managing dip facilities and maintaining the tickicide. As part of the agreement for transferring control of dips to stockowners, the Department has undertaken to repair facilities to a serviceable condition.

Two CEP projects repaired 500 of the 800 dips. Repairs to the remainder will be completed during 1987–88 year by Board of Tick Control staff assisted by 20 aboriginal trainee inspectors of stock, employed under a training scheme sponsored by the Commonwealth government. Trainees are receiving instruction in all aspects of Inspector of Stock duties and up to 15 will be

given preference for employment as temporary staff from February to June 1988.

Two areas, East Cullendore and North Tabulam, are under preparation for release from the Tick Quarantine Area. East Cullendore was released on 30 June 1987, but discovery of a tick infestation has deferred release of the North Tabulam area.

Within the Tick Quarantine Area, savings in expenditure on cattle tick control continue to be made through non-replacement of staff. Since the changes to the policy were announced in 1983, savings of \$3.6 million have been achieved. Further savings have been made through computerisation of information on activities such as annual dippings, annual examinations, dip leases and laboratory management. Savings at Woodburn Gate were achieved by restricting surveillance to risk vehicles only.

Clean country. Outbreaks of ticks that occur outside the Tick Quarantine Area are eradicated. In early 1986, 15 infested properties were found in the Grafton area. This put more than 280 properties at 35 localities on the north coast under suspicion and they were quarantined. Half of these underwent an eradication treatment program using pour-on tickicide. All properties except 43 have completed two examinations and were released from quarantine on 30 June 1987. The remaining properties will be held under surveillance for examination and release in 1988.

Bovine tuberculosis

Further significant progress was made in eradication of bovine tuberculosis this year. A large dairy herd, which had been in quarantine since February 1982, was finally released after testing for tuberculosis every three months during the period of quarantine. The herd has since been dispersed, mainly to slaughter. An outbreak of tuberculosis detected in a small beef herd was dealt with by destruction of the herd, ring tests and tracing. No further spread from this herd was detected.

By December 1986, NSW had, for the first time ever, no known infected herds. But in January 1987 tuberculous lesions were found in a young bull slaughtered at an abattoir. This animal came from a leasehold block in the Macquarie Marshes northwest of Dubbo. This area has numerous leasehold blocks

backing onto an extensive wetland area under the jurisdiction of the National Parks and Wildlife Service. In the midst of the marshes, many feral cattle moved from block to block, mixing with domestic cattle. Fencing was very poor or non-existent. As a result, more than 50 properties owned by 25 producers were evaluated for tuberculosis by either testing or destocking. Further tuberculosis-infected animals were detected among feral cattle which originated from the same block as the traceback animal, and among domestic cattle in close contact with them. Cattle are being systematically removed from the whole area.

Since 1975, eradication of TB has continued to rely on abattoir monitoring as the main means of detecting any remaining infected herds. New South Wales, together with Victoria and South Australia, should achieve the target of Impending Free of bovine tuberculosis by 1988, well ahead of the national target.

Bovine brucellosis eradication campaign

In line with a strategic plan set down in 1981 for eradication of brucellosis, all areas of NSW finished their third round of herd testing. A fourth round of check testing was applied to about 5% of the State's herds because analysis of their brucellosis histories put them into various high-risk categories.

During the year, brucellosis was detected in one herd on a routine check test in the Riverina area. Extensive investigation confirmed that infection had not spread within the herd or to neighbouring herds, but the herd was destroyed to prevent possible further risk.

Several blood samples taken from breeding cattle slaughtered at abattoirs gave positive reactions to serological tests. However, further testing of the herds of origin revealed no cases of infection.

There are now no herds known to be infected with brucellosis, although a few remain in quarantine until further tests confirm their negative status.

As a result of the downturn in brucellosis activity, the number of temporary staff employed on BTEC funds dropped during the year from 198 to less than 70. Staffing has now stabilised for the long period of abattoir monitoring and milk ring testing needed to prove that NSW is indeed free of bovine brucellosis.

Abattoir monitoring in breeding cattle and monthly milk ring testing on the dairy herds is likely to continue until 1992 to ensure that bovine brucellosis has been completely eradicated from this State. New South Wales, along with Victoria and South Australia, expects to declare freedom from brucellosis on 1 January 1988.

Animal quarantine and livestock exports

As agent for the Commonwealth Department of Primary Industry, the Department implements animal quarantine policy within NSW and supervises preparation of animals for export.

Conditions were finalised to allow importation of dogs and cats direct from Norway and Sweden, and dogs direct from Japan. These importations are subject to meeting specified health requirements, and to quarantine on arrival in Australia in a mainland quarantine station.

Quarantine conditions for cattle imported from Canada were revised after extensive consultations between Australian Federal and State and Canadian animal health authorities. Since November 1981, shipments of Canadian cattle had been quarantined at the Animal Quarantine Station Cocos (Keeling) Islands for 90 days before becoming eligible for entry to the Australian mainland. As no Canadian cattle tested positively to exotic disease during this time, and as Canada is free from bluetongue and vesicular stomatitis, it was appropriate to review Australia's importation requirements. The first consignment of cattle to be imported under the revised conditions arrived in Australia earlier this year and underwent 30 days quarantine in the mainland quarantine station at Spotswood, Victoria.

Conditions for the importation of sheep from Denmark, Finland and Sweden and for the importation of sheep embryos from Denmark and Finland were also reviewed. Importation will only be permitted when Australia develops approved facilities for ensuring freedom from scrapie.

Elaphostrongylus cervi, an internal parasite of deer, was found in a consignment of deer from New Zealand while in post-entry quarantine in Victoria. All deer in a previous consignment from New Zealand were therefore traced and re-quarantined on-property to ensure that none of them was infected. Four properties in NSW were

involved in these investigations. All deer from this previous consignment tested negative on two samplings taken 30 days apart and were released from quarantine. Further consignments of live deer from New Zealand have been prohibited pending review of health conditions for importation of deer from New Zealand.

Exotic disease

Exotic disease plans. The Division of Animal Health completed a major review of operational plans for managing an outbreak of exotic disease in NSW. The plan was produced as a manual for use by departmental staff. It includes procedures to be used for recognition of an exotic disease, monitoring the standby phase, and for central and field control. Field control activities include surveillance, operations on infected properties, security and control of stock movement, feral and native animal control, scientific and administrative support, and public relations. Other sections of the manual cover special procedures for enterprises such as abattoirs, saleyards, and milk factories.

As a separate exercise, the Division is finalising agreements with several departments and agencies on their roles in an exotic disease emergency.

Exotic disease training. Three successful training courses in exotic animal diseases were held for rural veterinary practitioners at Camden, Tamworth and Coffs Harbour. The courses were sponsored by the Bureau of Rural Science, Commonwealth Department of Primary Industry, and were conducted by the Department of Veterinary Clinical Studies, University of Sydney, in collaboration with the NSW Department of Agriculture. The courses aimed at increasing rural veterinary practitioners' confidence in recognising the possibility of an exotic disease outbreak and in responding to the emergency.

Interstate exotic disease exercises. Officers of the Division of Animal Health participated in training exercises in Victoria and Queensland. The Victorian exercise concentrated on teaching staff to make management decisions necessary to run an eradication campaign in a Regional Emergency Centre. The exercise in Queensland was designed to test the draft plan for controlling feral pigs in an exotic disease outbreak.

Interstate movement of livestock

Existing health requirements for the introduction of stock into NSW, whereby livestock introduced from other States must meet certain health provisions, were reviewed. As a result, the NSW health certificate was redesigned to make it easier to complete and to reduce costs to industry.

Intrastate movement of livestock

Controls on movement of stock within NSW were also examined. These include movement of cattle into the Tick Quarantine Area and pigs from saleyards to abattoirs. Existing controls rely heavily on attendance of Inspectors at saleyards in order to issue documents. As a result of the review it is planned to reduce involvement of Inspectors in this activity and to divert them to higher priority areas. Greater reliance will be placed on certification by owners.

Saleyard review

Regulatory activities undertaken at saleyards by departmental officers and by officers of Pastures Protection Boards were reviewed to take account of changes to departmental policies, selling strategies by producers and community attitudes to regulation. Submissions were made to the review committee by the Council of Advice of Pastures Protection Boards, the NSW Farmers Association and the NSW Division of the Cattlemen's Union. As a result of the review it is planned to withdraw Inspectors from low priority areas. This strategy will allow greater flexibility to reallocate staff, and to reduce costs to Pastures Protection Boards.

ANIMAL HEALTH RESEARCH

Development of improved vaccines

Recent advances in immunology have encouraged research into improving existing animal vaccines and developing of new ones. A highly effective vaccine was tested against erysipelas arthritis in pigs. This product will now be developed for worldwide marketing as a joint venture of the Department and commercial enterprise.

In footrot studies in sheep, the causes of field breakdowns of commercially available vaccines were determined. This work led to the identification of unique proteins of *Bacteroides nodosus* (the organism that causes footrot) which are common to different

strains and which will form the basis of a new vaccine for testing in animals.

Recent outbreaks of the highly infectious virus disease laryngotracheitis (see Poultry health, above) and further deaths of chickens from vaccination prompted research into the development of a safer vaccine. Virus isolates of a lower virulence are being tested for their efficacy in chickens of broiler age using mass immunisation techniques.

Sheep itchmite

The itchmite parasite *Psorergates ovis* lives just below the skin surface of sheep, causing intense itching of affected areas in most sheep. To gain relief, sheep rub themselves vigorously on fences, making the fleece ragged. The itchiness results from massive invasion of the skin layers by special cells called mast cells, which release irritant chemical substances into the tissues. Some sheep show little response to the mite, however, and the reason for this is being investigated. Transmission studies have shown that close contact between ewes and newborn lambs results in significant spread of the parasite within a flock. Close confinement of sheep after shearing also encourages rapid spread of the parasite to previously healthy sheep.

Skin ulcer on fish

Outbreaks of an ulcerative disease in goldfish caused by the bacterium *Aeromonas salmonicida* were diagnosed in commercial hatcheries and in fish trapped under natural conditions. When the pathogenicity of *A. salmonicida* was investigated in various fish of economic importance in NSW—such as Atlantic salmon, and rainbow, brown and brook trout—departmental researchers confirmed overseas findings that the disease is highly contagious.

INFORMATION TECHNOLOGY

Specifications for the Pig Health Monitoring System and upgrades to software used to manage the system were completed. In this system, data are gathered for diseases of growing pigs—such as pneumonia and arthritis—that can be detected at abattoirs. The system runs at five abattoirs. Quarterly reports to pig producers highlight disease problems, suggest what is achievable in disease control and advise on sources of information. With the new software in place, the data can be reviewed to determine longterm trends.

CONSUMER PROTECTION

Veterinary Surgeons Board

The Veterinary Surgeons Act 1986 and the Veterinary Surgeons Regulations 1987 came into effect on 1 April 1987. Currently 1759 veterinarians are registered and 521 veterinary hospitals are fully licensed under the Regulations.

At the same time a new Veterinary Surgeons Board was formed and an additional person included from the University of Sydney. The Director-General has delegated responsibility to the Veterinary Surgeons Board for the administration of the Veterinary Hospital Regulations so that the Department of Agriculture will no longer be involved in administration of this Act.

In addition, a new Veterinary Surgeons Investigating Committee was appointed to investigate complaints by the public against veterinary surgeons. This committee has received 41 complaints against veterinary surgeons, of which 28 have been dismissed and 13 remain to be finalised.

Stock Medicines Board

The Stock Medicines Board considered 301 new product applications and 1928 re-registrations in 1986–87.

On 24 November 1986, the first meeting of the newly formed Consultative Committee was held to liaise with industry on stock medicines. The committee comprises representatives from the Agricultural & Veterinary Chemicals Association, Australian Veterinary Association, Australian Veterinarians in Industry, Veterinary Manufacturers & Distributors Association, and members of the Stock Medicines Board. Its aim is to provide a forum for discussion on stock medicines.

Amendments to the Stock Foods and Medicines Act were proclaimed on 27 March 1987. The main changes are an increase in membership of the Board from four to six, increased penalties, power to seize unfit stock medicines, the ability to adopt standards by reference to a recognised standard, and provision to control a product at the point of use.

During the year four companies were convicted of 10 offences of selling unregistered stock medicines. One company was convicted of advertising a stock medicine for uses outside its registered claim.

Chemical residues

To ensure adequate consumer protection, monitoring for a range of chemical residues is undertaken jointly by this Department, the Commonwealth Department of Primary Industry and the NSW Dairy Corporation.

Levels above half the accepted residue level result in a visit to the farm of origin to endeavour to eliminate or greatly reduce the problem. Levels above the maximum residue level require more drastic action, including removal of dairy cattle from milk supply and detention of cattle and pigs from sale.

A major change has been to commence screening for antibiotic residues in meat at abattoirs rather than at regional laboratories. This should reduce the delay between detection of a problem and taking action on the farm.

A statewide survey of pesticide residues in stockfeeds covered 260 products being offered for sale. The presence of dieldrin was revealed in only five products, four of which were at the same mill and had come from the same source. All affected products were withdrawn from sale and destroyed.

Of almost 10 000 monitoring samples taken for analysis from cattle, pigs and poultry, 56 showed residue levels above the acceptable maximum and 96 between half and the maximum acceptable residue level. At any one time, there are usually about 10 properties in detention.

Domestic meat standards

Further progress has been made to upgrade poultry processing plants to the Australian Uniform Standard for construction and hygiene. There has been an increase in poultry processing plants from 110 to 140, mainly as a result of the development of further processing of smallgoods and prepared foods.

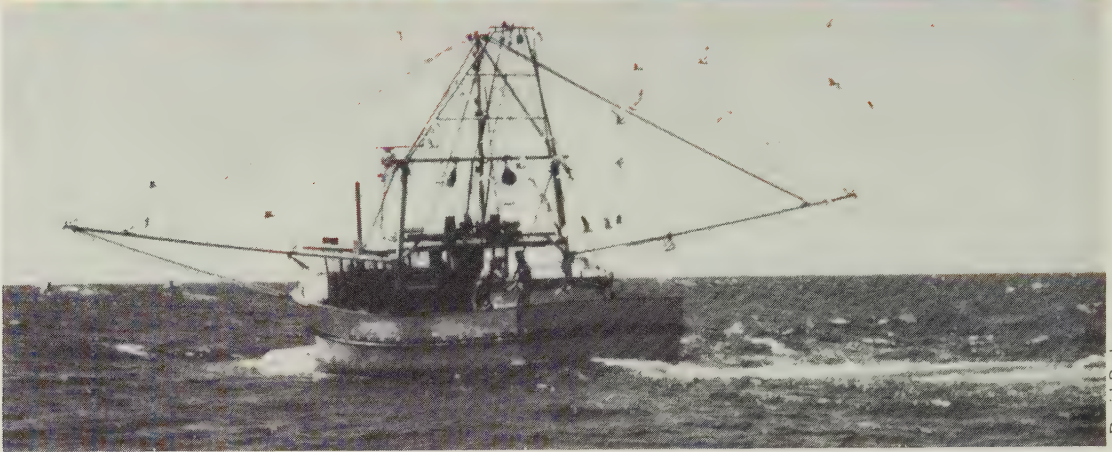
Marine regulation and management

Marine research and development

Inland regulation and management

Inland research and development





David Rodgers

A prawn trawler working off Iluka on the north coast. Management of the East Coast Prawn Trawl fishery is to be wholly transferred to the States under the Offshore Constitutional Settlement. The allocation of access rights to the estuarine and offshore areas was discussed with industry in preparation for an overall inshore management plan.

FISHERIES MANAGEMENT

Offshore fisheries

The Department dealt with a massive increase in enquiries and licence transactions following changes in the management of the South East Trawl, East Coast Trawl and Tuna Longline Fisheries which are substantial fisheries for NSW. The management of all these fisheries is being affected by the imminent offshore constitutional settlement, arrangements for which continued this year.

The South East Trawl Fishery in particular changed rapidly with the landing of several million dollars worth of orange roughy (*Hoplostethus atlanticus*) which had not previously been landed in quantity in Australia. Such a large and instantaneous increase in the value of a fishery places greatly increased demands on management and licensing staff.

Two courses were held for professional fishermen, one on netmaking and the other on use of echosounders.

Inshore fisheries

Management plan. Some progress was made on the formulation of an overall management plan for inshore fisheries. Efforts during the year were directed at establishing a single representative industry body that would provide an effective consultative mechanism.

To this end, a discussion paper was prepared for circulation to industry.

During 1986–87 a fully computerised licensing and catch statistics system was implemented. The considerable resources devoted to this project meant that some other areas of management received less attention than usual, but once the system is in place, a much better service will be provided to commercial fishers and the public.

Discussions with industry on an overall management plan resulted in a decision to base the plan on both fishermen and boats. The need for changes in the licensing section of the Fisheries and Oyster Farms Act was identified so that a master fisherman's licence could be created. This would increase professionalism in the industry and make it easier to implement a sound management plan.

Licensing. Fewer operators and boats were licensed for commercial fishing than last year but there was a dramatic increase in boat and licence transfers.

Staffing. An additional position was created in the policy and management section of the Division of Fisheries. This is consistent with the findings of a review of fisheries research, which recommended that more senior

scientific officers be appointed to the policy and management area to relieve research staff at the Fisheries Research Institute, Cronulla, of some administrative duties.

Legislation and law enforcement. Law enforcement used a substantial part of the budget for fisheries management. The benefits of this enforcement are not always readily apparent, but the results of many hours work by dedicated inspectors would be evident if those inspectors were not present.

The implementation of a penalty notice system (on-the-spot fines) continued with penalties increased to \$100 and the system extended to include additional offences. Expansion of this system has further reduced the workload on the courts. Average fines imposed by the courts for fisheries offences increased, as did the number of prosecutions for serious offences.

Abalone. With the devaluation of the Australian dollar and recent management innovations in the abalone (*Haliotis rubra*) fishery, a serious abalone poaching problem has developed and increased management and law-enforcement resources were used to deal with the problem. The Department assessed the extent of poaching compared with legitimate commercial and recreational harvesting, and doubled the number of prosecutions. In some instances, penalties imposed exceeded \$1000.

HABITAT MANAGEMENT

Environmental assessment. In recent years an increasing proportion of the Department's fisheries management resources has been devoted to protecting the fisheries environment. In 1986–87 an environmental assessment unit was established and three scientific officer positions were created. This was done as part of the reorganisation of the Fisheries Research Institute to separate research and policy functions and thus improve the performance of both groups.

Aquatic reserves. Following the review of the Department's Aquatic Reserves activities last year, this function was transferred from the Fisheries Research Institute to the policy section of the Division of Fisheries. Preliminary discussions were held with the National Parks and Wildlife Service and Department of Lands officers and a more coordinated approach was developed.

Draft management plans for the Jervis Bay and Lord Howe Island Aquatic Reserves were finalised in preparation for submission to public review. The Towra Point Aquatic Reserve management plan was finalised after substantial amendments were made to the original draft in line with comments received during public review. This reserve has been planned as a marine park with separate sanctuary and refuge zones. The final management plan was forwarded to the Minister for consideration.

Proposals for more than 20 estuarine aquatic reserves are currently being prepared. Some of the areas concerned are already partly protected by fishing closures and most of the proposals are expected to receive substantial public support. Proposals for the first five reserves were circulated to other State government departments before details were released to the public for comment.

AQUACULTURE

During the year delays in renewing oyster leases were reduced from five months to under two months and the fish farm permit scheme was streamlined.

The Department continues to offer an advisory service to oyster farmers on the operation of purification plants and on any necessary changes to plant. There are 280 such plants in NSW, located in all the major growing areas.

Prawn farming. Construction of 500 hectares of ponds for prawn aquaculture was approved and more than half are already completed. There are two commercial hatcheries producing postlarval eastern king prawns (*Penaeus plebejus*) for stocking of commercial ponds. In general, farmed prawns have shown good growth rates and fetch high market prices but the survival rate has often been disappointing. The Department continued to provide an advisory service to prawn farmers and to warn likely investors and farmers that viability of this industry was still uncertain.

Sydney rock oysters. A research/liason committee was established during the year as part of the Department's commitment to consult with industry on research and management of the Sydney rock oyster (*Saccostrea commercialis*). Spatfalls were good this year and increased production can be expected in two to three years' time.

Pacific oysters. All NSW estuaries were surveyed to assess the abundance of Pacific oyster (*Crassostrea gigas*) and the estuaries categorised according to incidence levels. The Pacific oyster control program was streamlined and rationalised following further

discussions with industry representatives. Movement of oysters from estuaries known to contain Pacific oyster, to estuaries where Pacific oyster has not been recorded, was banned.

MARINE RESEARCH AND DEVELOPMENT

FRV KAPALA

South East Trawl Fishery. The Fisheries Research Vessel *Kapala* continued to collect data and tag fish for the South East Trawl Fishery stock assessment programs. During July, August and September 1986, plankton tows were carried out between Sydney and Tweed Heads in an effort to delineate potential spawning grounds for gemfish (*Rexea solandri*). Larval gemfish were found throughout the Wallis Lake-Cape Howe area, with greatest numbers near Port Stephens.

Three cruises in late 1986 concentrated on the tagging of redfish (*Centroberyx affinis*) to determine fishing mortality and migration patterns. Movement was minimal and tag returns to date have been few.

Other activities. Underwater observations were made in Jervis Bay to evaluate fishing gear, including several types of otter boards and twin-rigged prawn nets. A pilot survey using trawling, plankton sampling, gill netting and trapping was carried out in conjunction with the Sydney Deepwater Ocean Outfall Study.

RESOURCE ASSESSMENT

Trawl fish. Field research has concentrated mainly on tagging large numbers of redfish as part of a project on this species. Biological and catch data are still being collected on gemfish to update assessment of the impact of commercial fishing operations on stocks. A new study is looking at catch data and biology of ocean perch (*Helicolenus percoides*), this being the first study undertaken on commercial catches of this species.

Comprehensive reports were prepared for the Australian Fisheries Service which, in conjunction with State governments, manages the trawl fish resource.

Snapper. A study of the NSW snapper (*Chrysophrys auratus*) fishery continued with most effort concentrated on Coffs Harbour stocks. Over 3500 snapper were tagged and

released, and more than 600 recaptured. This high recapture rate (17%) provided evidence that movement of snapper is usually localised, although several specimens moved over 200 km before being recaptured. Amateur catch data were recorded from fishing competitions.

Tuna. Landings and exports were recorded for the yellowfin tuna (*Thunnus albacares*) longline fishery. A program that commenced this year to determine migration patterns involved tagging more than 1000 fish. A biological program incorporating sampling of commercial and recreational catches continued. High prices, up to \$100 per kg, were obtained in Japan for individual good-quality fish exported from Australia. The commercial catch of yellowfin tuna has rapidly increased over the past few years to over 400 t, with more vessels fishing full-time for this species.

Yellowtail kingfish. Biological and catch statistics data were collected for yellowtail kingfish (*Seriola lalandi*) and over 8000 specimens were tagged in cooperation with recreational fishers. A recently commenced study will identify stocks along the NSW coast (including Lord Howe Island) using electrophoretic techniques.

Red-spot whiting. The NSW fishery for red-spot whiting (*Sillago bassensis* and some other *Sillago* spp.) was monitored using logbook data and catch statistics, and concentrated on two important centres, Iluka and Eden. Biological information, including length frequency data, age, length/weight relationships and reproductive condition were collected in order to develop sound management strategies for this species. This year has seen record exports of red-spot whiting.

At work on a commercial purse seine tuna boat.



Prawns. There was continued fortnightly monitoring of the commercial catch of eastern king prawns from the Clarence River, to determine fluctuations in adult prawn stocks. Monthly surveys of both Wallis Lake and the Hawkesbury River were aimed at compiling information on juvenile and adult habitat requirements and at monitoring commercial catches.

Lobsters. New studies are assessing stocks of eastern rock lobster (*Jasus verreauxi*). Commercial production of this species has severely declined in recent years.

Departmental researchers studied the distribution by size and sexual maturity of lobsters off Port Hacking and Crowdy Head, and set up growth and tagging experiments in aquarium facilities at the Fisheries Research Institute, Cronulla.

Crabs. Two commercially important species of crab, the spanner crab (*Ranina ranina*) and mud crab (*Scylla serrata*), are currently being studied. Mud crab production has severely declined, and spanner crabs represent a new commercial species. The studies are aimed at defining optimal management regimes to protect stocks of these crabs in NSW waters.

RECREATIONAL ANGLING

Gamefish tagging. This was a very successful year in the tagging program, which helps with distribution studies. Anglers tagged about 9000 gamefish, including more than 1000 black marlin. There were also around 200 reports of recaptures of tagged fish, including some of fish that had travelled long distances (a few over 4000 km) from where they were first released. A record time of 4.9 years at liberty was set by an albacore (*Thunnus alalunga*).

Estuarine surveys. Studies of recreational and commercial fishing in two large estuarine lakes, Lake Illawarra and Lake Macquarie, were initiated in 1987. They were partly funded by the Electricity Commission. The Lake Macquarie study is a follow-up to a previous study carried out under contract by the Division of Fisheries.

ENVIRONMENTAL STUDIES

Habitats. A Canal Estate Design and Inventory Report was prepared to assist in establishing codes for design and development appropriate to canal estates on coastal waterways.

Habitat improvement. Monitoring of several mangrove transplanting areas on the Parramatta and Hawkesbury rivers continued and rehabilitation programs were designed for areas in Port Stephens and Ballina. In Nowra, a mangrove seedling experiment to determine survival rates was started. Seagrasses transplanted into Botany Bay survived until a major storm terminated the experiment.

Jervis Bay. The Department completed an important study on the likely impact on fisheries resources of siting naval facilities in Jervis Bay. A report was provided to the Australian Government, which funded the study under an agreement with the State.

Sydney deepwater ocean outfall. In March a six-month pilot survey was begun in cooperation with the Metropolitan Water, Sewerage and Drainage Board to look at the effect of three proposed ocean outfalls (off North Head, Bondi and Malabar) on fish and soft-bottom benthic communities. The study was funded by the Board.

Fish ecology. Further to studies of two south coast lakes undertaken last year, the Department commenced investigations on another five intermittently opening coastal lagoons on the north coast (the four Gosford lagoons and Smiths Lake). Preliminary results show that the movement of many species of fish through these lagoon habitats is related to the opening and closing regimes. On several occasions fish in advanced sexual condition have been captured near the closed mouths of the lagoons, indicating that a salinity gradient is probably important in breeding behaviour.

Monitoring of populations of two species of introduced oriental gobies continued in an expanded study area taking in estuaries between Newcastle and Wollongong. New sightings of *Acanthogobius flavimanus* were recorded from the Hawkesbury River and *Tridentiger trigonocephalus* from Port Kembla Harbour. The abundance of both species has increased in the Sydney area.

AQUACULTURE

At the Port Stephens Brackish Water Fish Culture Research Station (BWFCRS) the new visitors' centre was completed and work is well advanced on the new \$2 million oyster hatchery. Extensions were also made to the bass hatchery.

Prawns. With pilot studies completed in the Clarence River area, research on prawn aquaculture was based at Port Stephens this year. Experiments were carried out on the environmental and nutritional requirements of school prawns (*Metapenaeus macleayi*) and leader prawns (*Penaeus monodon*), both in ponds and aquariums. It was found that both species can tolerate fairly high levels of ammonia in seawater; that low pH levels (associated with certain acidic soils) can depress the survival rates of leader prawns; and that the optimal temperature range for growth of leader prawns is 27 to 33°C.

As a service to the industry, commercial prawn diets were evaluated as they became available.

Oysters. The study of spatfall in Salamander Bay has identified many factors affecting the availability, settlement and recruitment of larvae of the Sydney rock oyster in the commercial spat-catching areas of Port Stephens. The methodology and baseline data established during this study have wide-ranging application in the assessment and optimal use of spatfall in other estuaries.

Monitoring of spatfall of the introduced Pacific oyster in Port Stephens continued. Spatfall in the inner harbour, except for the Karuah River, was much lighter than in the previous season. The reduction in spatfall may have been caused by unusually low water temperatures during December 1986 and high salinities prevailing throughout the

In Quarantine Bay, Eden, staff of the Division of Fisheries collect jackass morwong in a holding tank to check the effect of tagging on mortality rates.





At the Department's Brackish Water Fish Culture Research Station, Salamander Bay, researchers have developed methods of rearing Sydney rock oysters under controlled conditions. Pictured is Caroline Mason, Technical Officer, who is working on selective killing of Pacific oysters where they occur in mixed populations with the prized Sydney rock oyster.

1986–87 summer in the inner harbour. Spatfall of Pacific oysters in the outer harbour was much heavier than in the previous season.

Considerable resources were applied to develop techniques to selectively kill Pacific oysters in mixed populations with Sydney rock oysters. When oysters are dried for 48 hours at $35 \pm 1^\circ\text{C}$, more than 98% of Pacific oysters are killed but less than 15% (usually 5 to 10%) of Sydney rock oysters die.

Several experiments were conducted on the disease known as winter mortality. By raising

the growing height of trays to 150 or 300 mm above the normal height, researchers found that mortalities from this disease were reduced to almost nil. Mortalities from the disease were also greatly reduced by moving oysters upstream in summer.

Results from further experiments carried out at the Vales Point Power Station with hatchery-produced spat of Sydney rock oyster were disappointing. Growth and mortality rates at the warmer outlet of the power station were no better than those at the cooler inlet. It now appears there is no commercial

advantage in using heated effluent from coastal power stations for the nursery culture of spat in winter.

Staff at the BWFCRS continued to improve oyster hatchery and nursery techniques to enable spat of both Sydney rock oyster and flat oyster (*Ostrea angasi*) to be produced for sale from the new hatchery.

In moves to assist future exports, bacterial loads in two areas of Port Stephens—

Tilligerry Creek and North Arm—were monitored under the growing area classification scheme. These areas can now be classified 'clean', which means that their waters meet specified standards of purity for holding oysters prior to export. Monitoring for the classification of other growing areas in Port Stephens and Quibray Bay in Botany Bay is continuing.

INLAND REGULATION AND MANAGEMENT



A demonstration of stripping trout eggs at Dutton Hatchery, Ebor, where a new visitors' centre opened this year.

STOCKING OF WATERWAYS WITH FISH

To improve recreational fishing, the Department stocked waterways with juvenile fish and ova and also distributed such material to acclimatisation societies and angling clubs. By this means, about 3.95 million juvenile fish and 0.5 million ova were added to 30 waterways in 1986–87.

Production and distribution of golden perch (*Macquaria ambigua*) and silver perch (*Bidyanus bidyanus*) resumed after the Inland Fisheries Research Station at Narrandera was cleared of goldfish ulcer disease, which appeared there last year. Constant monitoring of the hatchery for this disease will continue.

Facilities. A new visitors' centre at the Dutton Hatchery at Armidale was opened by the Premier. Such centres give the public greater access to the facilities and activities of the Department. An unusually warm summer combined with some water supply problems destroyed much of the broodstock at the hatchery and modifications to the water supply system were undertaken to overcome the problem.

At the Gaden Hatchery at Jindabyne, fish stocks were tested for the presence of a viral disease which had been found in commercial fish farms, but there was no evidence of the disease in fish at the hatchery. Isolation and quarantine procedures were modified to ensure the disease was kept out.

HABITAT MANAGEMENT

Major issues such as wild and scenic rivers, wilderness protection, protection of habitats of endangered species and overall management of catchments and rivers (e.g., the Murray-Darling basin) placed demands on the Department during the year. The creation of an environmental assessment

team was an important achievement for the future protection and management of resources.

Fisheries interests were directly represented at the first meeting of the Murray-Darling Ministerial Council which was set up last year. As a result of a workshop on de-snagging, the River Murray Commission has recognised the extent to which such activities can damage important fish habitats and has agreed to joint on-site inspections of proposed works. It has also agreed to the construction of a fish ladder on Torrumbarry Weir, and to fund a joint program aimed at re-stocking the lower Murray River with Murray crayfish (*Euastacus armatus*).

Close liaison with the Metropolitan Water Sewerage & Drainage Board and the Department of Water Resources has resulted in construction of fishways on three weirs on the upper Nepean River and also on Penrith weir. These fishways will increase migration of fish, particularly the Australian bass (*Macquaria novemaculeata*). The Department of Public Works consulted frequently with this Department on construction of dams and

Two research officers from the Fisheries Research Institute, Cronulla, collecting Australian bass in a coastal waterway.



fishways and particularly for the instream flow requirements in the Mann River, which is a known habitat of the endangered eastern freshwater cod (*Maccullochella* sp. nov.).

Draft management guidelines for freshwater habitats were prepared for publication and distribution to local government authorities. These guidelines will assist in environmental planning and assessment.

A member of the Department's fisheries staff attended an adaptive environmental assessment and management course at Macquarie University, which was aimed at integrating habitat simulation modelling with broader resource and management data.

MANAGEMENT AND LAW ENFORCEMENT

Trout cod. In order to conserve the endangered trout cod (*Maccullochella*

macquariensis), a total ban was placed on taking trout cod and Murray cod (*M. peelii*) in the Murray River between Yarrawonga Weir and Tocumwal.

Murray crayfish. The amended Regulations on the taking of Murray crayfish came into force. These amendments set a minimum legal size and prohibited the sale of Murray crayfish.

Licensing. After 1984 no new commercial fishing licences for inland waters were issued. There were then 163 licence holders. This year 65 licences were renewed, a reduction of 16 from last year.

Aquaculture. There was a resurgence of interest in freshwater aquaculture during the year and several large proposals required liaison with regulatory and management staff.

INLAND RESEARCH AND DEVELOPMENT

RESOURCE ASSESSMENT

Eucumbene. Rainbow trout (*Salmo gairdneri*) that were finclipped in 1985–86 first appeared in the angler catch in summer 1986–87. In March 1987 there was another experimental release of 50 000 finclipped rainbow trout. These fish will help identify the proportion of stocked fish in angler catches. In June 1987 more than 800 brown trout (*S. trutta*) were tagged during their spawning run to help determine growth rates and migration patterns in the dam. Collection of angler catch data continued at six sites around the dam.

Blowering. Continued biannual monitoring of this impoundment indicates the presence of large numbers of redfin (*Perca fluviatilis*), goldfish (*Carassius auratus*), and golden perch.

Lake Hume. During a survey in early 1987 designed to test the success of stocking the dam with golden perch in 1980–84, goldfish with goldfish ulcer disease were found. This, the first recording of the disease in Lake Hume and the upper Murray system, indicates that the disease could be widespread in the Murray waterways.

Burrinjuck. The Macquarie perch (*Macquaria australasica*) spawning run was successfully trapped in October to allow spawning fish to

be tagged. Regular sampling operations ceased in the dam after 1986 and the results of the two-year survey are being analysed. The redfin population has remained low and has not spread throughout the dam waters.

The Department liaised with the Department of Territories and Local Government of the ACT on management of Macquarie perch populations in Googong Dam, Murrumbidgee impoundment.

Glenbawn. Catches of Australian bass from this impoundment resulted from stocking of the dam with fish from the BWFCRS in 1985. The Department made a further experimental stocking of 9000 bass larvae in 1987 to test the ability of younger bass to survive handling and transport to fresh water.

Macquarie perch. Following preliminary electrophoretic studies on the systematic status of Macquarie perch which identified at least two distinct stocks of this species, surveys were carried out on populations in drainages east and west of the Great Dividing Range. No specimens were found in the impounded waters of Tallowa Dam, although large European carp (*Cyprinus carpio*) were recorded in Tallowa for the first time. The population of perch in the Mongarlowe River has apparently declined since it was first investigated over 10 years ago, but there is a

large population in the upper Kangaroo River. Only a few specimens were collected in Wyangala Dam.

A new survey technique involving use of a nightlight and plunge trap was developed for tagging Macquarie perch in shallow, clear streams.

Grayling. Investigations on the distribution and abundance of the restricted species the Australian grayling (*Prototroctes maraena*) resulted in a new record of distribution in the Yowaka River near Eden.

ENVIRONMENTAL STUDIES

Pesticides. Fish from the Macquarie Marshes, Menindee Lakes and Lachlan River were analysed for pesticide residues and no significant levels were found.

Sydney area. Field studies on the effect of sand and gravel extractions on fish populations continued. A study of recruitment of bass larvae was initiated, using artificial habitats. The aim is to look at macrophyte utilisation by bass larvae.

Fish passage. Laboratory investigations on the fish passage requirements for golden perch, silver perch and Australian bass have been successful. These investigations have involved swimming speed trials with varying experimental parameters (such as water velocity and time of exposure) using an experimental flume and vertical slot fishway. Most juvenile bass could achieve a swimming velocity of 1.2 to 1.4 m/sec.

AQUACULTURE

Stocking of farm dams. Trout cod were bred successfully for the first time. Several farm dams in the Albury area were stocked on a trial basis to establish captive breeding populations. Trout cod were also released into the upper Murray River near Jingellic. Spawning trials with wild Macquarie perch from Burrinjuck indicated that fish may need the stimulus of running water before they will ovulate. Techniques for incubation and rearing of this species are still in the experimental stage.

Technical services

Education

Grants for research

Marketing and economic services

Export development

Overseas projects



TECHNICAL SERVICES

MANAGEMENT AND COMPUTING SERVICES

AGNET computer network

The Department drafted a strategic plan that outlines priorities and procedures for development of information systems for the next five years. A submission seeking funds for major components of this plan was submitted to the Computer Funding Priorities Committee.

In order to accommodate increased workloads on AGNET, the capacity of the Department's computer network was expanded as follows:

- McKell Prime 9950 upgraded to a 9955-I. Memory increased to 16 MB.
- Additional 1000 MB disc capacity added to McKell 9955.
- Regional Prime 550s had additional memory and communications lines installed.
- The number of terminals increased to about 400 Apricot microcomputer and 100 'dumb' terminals.

The network itself was extended to Goulburn, Nowra and Berry. A packet assembler/disassembler (PAD) was installed at the Agricultural Research Institute, Wagga Wagga, to provide additional access to AGNET for staff at that centre.

On 1 July 1986 the Department introduced a computer-based accounting system to coincide with the implementation of program budgeting. The system operates as a fully distributed database running on the McKell Prime 9955 and on each of the regional Prime 550s.

In early 1987 the Dairy Herd Improvement Program was transferred from the Public Service Board Computing Bureau to AGNET. Consultants were engaged to assist in several areas throughout the year:

- design of an information system on pesticides registration and use;
- programming of the Fisheries Licensing and Catch Statistics System;
- programming of the Farm Produce Sellers Register.

The Department developed and implemented a Management Information System (MIS). MIS runs on the McKell

Prime 9955 and provides a database of information on the activities of the Department's professional and technical staff in the preceding financial year, and of the Department's total activities on an industry and function basis.

BIOMETRY

The Biometrical Branch provides statistical advice and services to departmental officers. This can be conveniently considered in three sections:

- monitoring the development of new methods produced elsewhere, assessing them and making them available for use in the Department if warranted;
- research on statistical methods needed for specific agricultural research projects;
- cooperating with scientific staff on projects requiring advanced statistical work.

All aspects of the design and implementation of research projects and surveys are covered. The Branch also provides detailed experimental plans and computer programs for statistical analysis of data.

The major statistical computer package, SAS, was acquired and made available on AGNET. It is widely used by biometricians but also has many features required by research and advisory staff. The Biometrical Branch conducted a course on the use of SAS at the Agricultural Research Centre, Trangie, and plans to run further courses. Arrangements have been made to acquire the statistical package MINITAB for use on microcomputers. MINITAB is well known, being used in most universities and colleges. Its acquisition will greatly assist staff with the analysis of data.

A computer program has been developed to produce experimental plans and layouts for plant variety trials. These plans incorporate features needed for the efficient 'nearest-neighbour' analysis developed recently by the Branch. The program has been used to provide advisory officers throughout the State with designs for this year's variety trials.

Estimates of the total quantity of apples in storage for each month in the season continued to be made from sample data supplied by district horticulturists.

The results of the survey on the geographic abundance of Pacific oyster, *Crassostrea gigas*, were collated and published. The survey, which covers 26 estuaries, established base-line levels of *C. gigas* in all major NSW oyster-growing areas. Proposals were prepared for a monitoring program.

The Branch also made important advances in the following areas:

- analysis of data from experiments on early breeding lines;
- 'nearest-neighbour' analysis of data from field trials using small plots. A biometrician was seconded to the Waite Agricultural Research Institute, University of Adelaide, to undertake cooperative work on this project;
- properties and existence of orthogonal sets of latin squares. Such sets are needed for the efficient conduct of long-term experiments in which treatments often need to be changed;
- efficient use of pre-treatment observations in the design of experiments.

ARCHITECTURE

The relocation of veterinary laboratories and associated research facilities from Glenfield to the John Macarthur Agricultural Institute, Camden, is the largest single capital works project to be undertaken by this Department. Work has commenced on Stage I at a cost of \$21,195,000. All stages of the project are planned for completion by 1990. The Department's Architect was committed to the preparation of building plans and specifications, with design, documentation and supervision of construction being carried out by the Department of Public Works.

The Capital Works allocation for 1986-87 was \$5.2 million, including \$2 million for the purchase of plant, for roadworks, and for some cottage maintenance.

Major works completed during the year

Safety renovations to Block C—BCRI, Rydalmere	\$1,175,000
Outreach centres for farmer education—Deniliquin and Temora	243,000
Advisory facilities, Mudgee	127,000
Office/boatshed, Narooma	108,000
Office/boatshed, Merimbula	95,000
Visitors' Centre, Brackish Water Fish Culture Research Station, Salamander Bay	432,000
Visitors' Centre, Horticultural Research and Advisory Station, Gosford	175,000
Renovations, Mitchell Laboratory, Agricultural Research Centre, Trangie	74,000
Cottage, Agricultural Research Station, Narrabri	59,000
Purchase of cottage, Umina	88,000
Purchase of irrigation property for research, Deniliquin	290,000

The Section also supervised construction of several buildings under the Community Employment Program, including the visitors' centres at Gosford and Salamander Bay.

Two Outreach centres (Temora and Deniliquin) were funded by the Commonwealth Tertiary Education Commission and completed in 1987. The Commission also provided \$1,219,000 for library extensions, a farm demonstration hall and other renovations at the C. B. Alexander Agricultural College, Paterson. Documentation of plans and specifications for these improvements was completed and tenders called.

ASSETS

The Department has 27 research establishments with extensive laboratory facilities, and two agricultural colleges. These are located on a total 14 787 ha of agricultural land where crops and livestock, essential to the Department's research, advisory and educational functions, are produced. The Department also occupies 1582 ha of land comprising the Camden Park Estate.

During 1986-87 the Department spent \$1.4 million on the purchase of new plant and equipment to replace obsolete items, to take advantage of new technology, and to keep its operations efficient.

PUBLICATIONS AND INFORMATION

Publications, videos, displays, radio and television are used more extensively than ever before as an efficient means of getting the Department's information to the public.

Disc-to-disc typesetting

The Department has been typesetting larger publications such as this Report direct from word processor disc since 1981. 'Disc-to-disc typesetting' has reduced some individual

typesetting costs by up to 60%, but until 1986–87 the method was available only through a few commercial typesetters, and was suitable only for large jobs. With the installation of state-of-the-art equipment at the Government Printing Office in 1986, disc-to-disc typesetting became a possibility for all the Department's typesetting. Staff are being trained, special programs have been written and several work practices have been changed. Planning is now well advanced to allow most of our publications to be typeset direct from the edited and coded computer disc. At present, about 10% of the Department's typesetting is being handled entirely from authors' edited discs.

Printed publications

Two new books were released in April 1987. *The Fresh Seafood Cookbook*, written by Cheryl Goodman and Vo Bacon and co-published with the Fish Marketing Authority and Regency Press, is a full-colour companion to *The Fresh Vegetable Cookbook* and *The Fresh Fruit Cookbook*. More than 1700 copies were sold in the first three months at the introductory price of \$12.95 (374 of these were sold from the Department's stand at the Royal Easter Show). The second book, *Weeds: an Illustrated Botanical Guide to the Weeds of Australia*, written by B. A. Auld and R. W. Medd and co-published with Inkata Press, is the definitive book on Australian weeds. More than 450 copies were sold through the Department in the first month (at the introductory price of \$55) and about 950 copies had been sold by 30 June.

Printed research, advisory, regulatory and educational information is supplied in various forms to a wide range of audiences. An estimated 2500 items were produced during the year, including 232 major items produced in Head Office.

The main information series, Agfacts, increased its coverage of agricultural and fisheries information intended for the public, and the 1000th title was produced in July 1986. Since the introduction of Agfacts in 1981, 1106 titles have been published, some in several editions; and 115 new, and 25 revised titles were produced during 1986–87.

Prices charged for Agfacts have not changed since 1982, despite the great increases in printing costs since then. Prices will increase on 1 July 1987, but the mailing

charge has been removed for non-discounted orders.

Agfacts are available from all departmental offices and by mail. Since 1984, they have also been available by subscription through the Government Printing Office. For an annual fee (presently \$45), subscribers are mailed batches of all new and revised Agfacts as they are produced.

The number of subscribers fluctuates from month to month. From a high of 1665 in 1985, subscriptions fell to 865 in mid-1986, then rose to 1717 in February 1987. The latest figures show 919 subscribers to the series in May 1987.

Displays

Professionally designed and constructed displays, when staffed by agricultural and fisheries experts and sited correctly, are an excellent medium for providing information. They are expensive, however, and the Department recently evaluated more cost-effective display systems.

Major displays were again placed at the Royal Easter Show, Sydney; Agquip, Gunnedah; the Australian National Field Days, Orange; and at numerous other field days, conferences and country shows.

Allied posters, stickers and brochures produced by the Publications & Information Unit also brought many messages to public attention. Just a few of the many items produced were: posters on acid soils, on postharvest temperature control of fruit, vegetables and cut flowers, and on pasture varieties; and brochures on two books produced by the Department, and on courses available from the two agricultural colleges.

Media

The Department has journalists located at eight country centres and at Head Office. These, the media officers, liaise with advisory, research and regulatory staff to ensure that current, accurate information on departmental activities is always available to the press and electronic media in a ready-to-use form.

Libraries

The Department maintains 11 staffed libraries plus working collections at other departmental locations. These collections are organised as a network and supervised by a Librarian-in-Charge and specialised librarians



Pesticides advisory programs continue to stress correct application techniques and the need for suitable protective clothing while applying pesticides. A new booklet, Care with pesticides on the farm and orchard, was issued this year and distributed widely among rural landholders.

at the central library, and by 10 regional librarians plus assistants in the country. Collections consist mainly of journals and reference books appropriate to the officers and their disciplines.

The library network spends most of its book vote on journals to keep officers up-to-date in their areas of expertise. This year we bought, exchanged or were given 4802 items (representing 2342 titles) to the value of \$360,075. A limited number of specialist books were also purchased.

The Department uses four databases (two internal, and two external in cooperation with other bodies) to maintain and retrieve lists of information held by libraries. A monthly update of new additions for each database is issued in booklet form to departmental offices and associated departments and companies.

During the year, the library contributed over 1000 entries to the Australian Bibliography of Agriculture and 8118 entries

to CLANN, the cooperative book catalogue which now contains about 550 000 entries. The internal databases are an index to journals, based on the WA Department of Agriculture's FARMTI, and an index to series received at Central Library.

Sales

Sales of publications to the public fell from \$220,788 in 1985-86 to a total of \$155,557 in 1986-87. This total was made up of \$64,738 from Agfacts; \$122 from fisheries posters and leaflets; \$48,981 from other books and posters; and \$41,715 from Agfact subscriptions. A further \$97,164 was received from the sale of Commonwealth-funded publications.

PESTICIDES

Legislative changes

Amendments to the Pesticides Act 1978 came into effect on 25 July 1986. These included a

change of title of the Act to Pesticides and Allied Chemicals Act 1978.

The new provisions of the Act include requirements for the proprietors of businesses engaged in the application of pesticides from aircraft to hold a licence. Pilots of such aircraft also require a licence under the Act. Under the Act, 38 Aircraft (Pesticide Applicator) licences and 133 Pilot (Pesticide Rating) licences were issued in 1986–87.

The Act allows for aerial application of pesticides to be prohibited in specified areas. An order under these provisions was made on 16 February 1987 prohibiting the application of any pesticides within 150 m of dwellings, schools, factories or public places without the written consent of the occupier or person in charge.

Provisions requiring that individual aircraft must be approved for use in application of pesticides have been repealed.

Registrations

The Pesticide Registration Section received and evaluated 418 applications for new pesticide products, 273 applications for registration of additional labels and 112 additional containers for registered products.

The Section continued its active role on the Technical Committee on Agricultural Chemicals (TCAC). Detailed submissions for clearance of 26 new pesticides and 57 major new uses for existing pesticides were evaluated through the TCAC. Additionally, the section assessed 13 proposals for clearance of technical grade active constituents for use in formulations of pesticides.

Permits are required before pesticides may be used for purposes or in a manner contrary to registered labels. Applications for the issue of permits totalled 316 in 1986–87.

The registrations of 17 products were cancelled. This action was usually taken on the recommendation of the National Health & Medical Research Council. Also on the advice of health authorities, permits which had been issued to allow use of chlordimeform insecticide on cotton were not renewed for the 1986–87 season.

Organochlorine compounds

The use of products containing aldrin, chlordane, dieldrin and heptachlor was again reviewed and controls over these compounds were further tightened on 1 January 1987.

These chemicals are now restricted to use for control of termites and borers in building foundations, subfloors, and soil around existing buildings, trees, tree stumps, poles, or fences.

Aldrin, dieldrin and heptachlor may now only be sold to, and used by, bona fide pest control operators. A minimum pack size of 500 mL has been imposed on chlordane products.

For all these compounds, the seller must keep records including the purchaser's name and address, the product name and quantity sold, and the date of sale.

Computerisation

A computer system is being developed to assist in registration procedures in the Pesticide Registration Section, and to provide comprehensive, up-to-date information on pesticides to departmental officers. The system will operate on the Department's computer network AGNET.

A consultant has designed a specification for the system, which should become operational late in 1988 or early 1989.

Advisory

The Pesticide Registration Section is increasing its advisory activities. More than 50 talks on pesticide registration and use were given at training schools for local government users, to grower industry associations, to public-awareness groups and at conferences.

Inspectors

In 1986–87, 2687 manufacturers, wholesalers, retailers, users and pest control operators were inspected under the Pesticides and Allied Chemicals Act 1978. These inspections led to 22 prosecutions, 10 of which related to misuse of pesticides, 10 to sale of unregistered pesticides, and 2 to possession of unregistered pesticides.

Inspectors carried out 324 investigations during the year. After five investigations revealed that misuse of pesticides had resulted in contamination of stockfoods, NSW farmers were advised through publications and other means on the correct use of pesticides in stored grain. As part of this program inspectors tested 103 grain storage areas for the presence of organochlorines. Inspectors also reported 296 unregistered pesticides during 1986–87.

Following withdrawal of agricultural uses of organochlorines, inspectors continued to advise the farming community of problems that would result from direct or indirect use of these pesticides on crops. This was done as part of an advisory program which also included distribution to agricultural chemical dealers of multilingual leaflets advising of restrictions on use of these pesticides.

ENVIRONMENTAL AND LAND USE STUDIES

The Pesticides and Environmental Studies Unit coordinates the Department's response on issues concerning environmental protection and land use throughout the State.

Land use

The Department's policy of protecting the agricultural land resources of NSW has been pursued through negotiations with Local Government and other Departments, especially during the preparation of local and regional environmental plans. To supplement this approach, a Draft State Environmental Planning Policy (SEPP) has been prepared for consideration. This policy seeks, by breaking the nexus between subdivision and housing, to promote the conservation, management and development of resources throughout rural NSW.

The Department of Agriculture also advised the Department of Environment and Planning on agricultural and fisheries matters relating to a series of plans in preparation. These include the Regional Environmental Plan for the North Coast; Draft Regional Environmental Plan for Orchard Hills; Kosciusko Regional Environmental Plan (Snowy River); Draft Sydney Regional Environmental Plan—Extractive Industries; Regional Environmental Plan—Murray River Riparian Lands; Regional Environmental Study—Macquarie Marshes; Regional Environmental Plan—Siding Springs Observatory; Far South Coast Regional Environmental Plan; and Illawarra Regional Environmental Plan No. 2—Jamberoo Valley. The Division of Fisheries assisted with preparation of SEPP 14—Wetlands.

The Department commented on and contributed to the following local environmental plans: Cowra, Young, Parkes, Bega Valley, Eurobodalla, Snowy River, Cooma—Monaro, Bathurst City, Tallaganda, Bombala, Yass, Wingecarribee, Kiama,

Cabonne, Temora, Hume, Conargo, Tumbarumba, Wentworth, Wagga Wagga, Hay, Singleton, Cessnock, Dungog, Port Stephens, Wyong, Parry, Guyra, Manilla, Barraba, Inverell, Kyogle, Ballina, Mudgee, Wellington and Narromine. Regional officers worked closely with the local councils of the places listed above to ensure that appropriate provisions, consistent with the Department's new initiatives, were included in the preparation of local environmental plans.

Environmental impact assessment

Many development proposals were referred to the Department of Agriculture for assessment of their environmental impact on rural land. The Department's responses to these proposals drew on the technical expertise of staff skilled in varying disciplines. The proposals included private developments as well as those being undertaken by public authorities and departments.

Among major development proposals examined and commented on by the Department, with a view to protecting agricultural land and minimising any adverse effects on agricultural and fisheries activities, were the Environmental Impact Statements on: Extraction of Sand—Springs Road, Elderslie, by Springvale Sands Pty Ltd; the State Highway—Princes Highway Reconstruction, Minnamurra River and Bombo; Electricity Transmission Line—Mount Piper to Marulan; and the Parkes Water Supply proposal by the Department of Public Works.

Determinations under the Mining Act

Under the Mining Act 1973, the Director-General has the statutory responsibility to determine classifications on lands likely to be affected by prospecting and mining. To determine the land classification, the subject area must be inspected and investigations made to find out if the land was used for cropping or pasture improvement before the mining application.

In the past 12 months, four exploration licence areas (each 256 km²), 24 prospecting licence areas (each 256 ha) and two mining applications (each 100 ha) were subject to determinations under the First Schedule of the Mining Act. In the process of making the determinations, 124 different landholders were interviewed and the relevant part of their properties mapped.

Mapping program

Land classification surveys are designed to assist planners in Local Government areas to assess the distribution of prime crop and pasture land and what zoning mechanisms are needed to protect it. These surveys are conducted by means of field investigations or the analysis of Landsat false colour images. Six million hectares have been mapped using the latter method, including the Shires of Parkes, Young, Boorowa, Gunnedah, and Yass (part).

Field surveys

The following Shires were mapped over the past year: Cooma–Monaro, Snowy River,

Tumbarumba, Bombala, Murrurundi, Cessnock, Singleton and Scone.

Pesticide monitoring of fish

Edible freshwater fish species in the Lachlan and Darling Rivers and the Menindee Lakes system were monitored for pesticide residues. DDT levels were found to be below the allowed maximum residue level (MRL).

In addition, commercial fish species from selected estuaries were monitored as part of an intensive organochlorine pesticide residue research program on the north coast.

EDUCATION

AGRICULTURAL COLLEGES

The Department administers two colleges, the C. B. Alexander Agricultural College at Paterson and Murrumbidgee College of Agriculture at Yanco. Programs at both colleges are directed at practical training in farm skills and in whole-farm management. They include tertiary courses for school leavers involving full-time on-campus residential studies, and home-study and short courses for practising farmers.

Course development

The C. B. Alexander Agricultural College revised the course for the Advanced Certificate in Agriculture. To enable students in that course to meet the requirement for one month's off-campus training three times a year, more than one hundred farmers have offered their services as cooperators. During the four-week on-farm period, farmers explain and demonstrate to the students the operation and management of a functional farm.

The revised Advanced Certificate in Agriculture places more emphasis on whole-farm management. Case studies aimed at providing practical farm management skills have been devised to stimulate discussion on relevant issues.

The Certificate in Dairying continues to provide a valuable apprenticeship opportunity for students. The highlight of the year was a tour to Victoria funded by the apprentices, the Dairy Industry Marketing Authority, the Dairy Farmers Co-operative and the Hunter Valley Co-operative Dairy Co. Ltd.

Courses at Murrumbidgee College have progressively moved away from an academic emphasis to practical farm training. During the year, farm skills training courses were consolidated and refined. Advanced Certificate students at Murrumbidgee College engaged in general off-campus farming activities such as work with advisory officers on press wheel trials, and on preparing land and sowing it to barley.

Cooperation with farmers

The colleges could not run courses without the cooperation of practising farmers. Farmers advise on and assist with development of new and revised courses, and train students in practical farm management.

Courses developed in consultation with farmer groups include:

- Farm financial management courses—the Ricegrower's Association.
- Comparative analysis Merino breeding courses—the Temora Agricultural Bureau.
- Rural crisis management—NSW Farmers Association.

Advisory councils

The advisory councils at both colleges provided support and advice on various matters, including future directions for the colleges and a review of methods used for recognising academic achievement.

Home study courses and short courses

The Correspondence Courses Production Unit continues to provide a valuable service



Students in certificate courses at the Department's two agricultural colleges—C. B. Alexander and Murrumbidgee—are given sound training in practical farm skills.

to farmers. In addition to the main courses of Farm Management and Farm Office Management a series of electives has been produced. These allow students to select from a range of options specific to particular rural enterprises.

In 1986, the first full year of operation for the Farmer Education Centre at Murrumbidgee College, 34 short courses were held at the Centre with an average attendance of 25 participants. Topics for these courses included alternative crop production, Beef-o-Nomics, computers, herbicide application, irrigated pastures, landforming, Merino breeding, rice farming, and trees on farms.

Resources

During the year resource development at the colleges included:

- construction of a multi-purpose shed for shearing and machinery demonstrations;
- production of a new series of leaflets, *Agskills*. These complement other printed material available through the Home Study Program;
- construction of the farmer education centres at Temora and Deniliquin;
- acquisition of a Belarus tractor donated by the Australian Wheat Board;
- construction of a spray table patternator to be used for testing and demonstration of boomspray nozzles.

Farm report

At C. B. Alexander College, machinery purchased with assistance by grants from TAFE provided a new bulk-milk handling facility at the dairy.

Students at Murrumbidgee College played a major role in the operation of the Yanco Research Institute in 1986. For example, they operated laser-levelling equipment to help in landforming for research plantings of rice. Such activities train students in carrying out technologically advanced farming practices, as well as assisting research at the Institute.

Enrolments

Total enrolments at C. B. Alexander College were similar to those for previous years, with a drop in full-time students being offset by increased enrolments in the Certificate in Dairying apprenticeship. At Murrumbidgee College, enrolments in the Certificate course varied little from previous years and all places in the Advanced Certificate course were filled.

To achieve maximum enrolments, the Colleges conducted an active promotional campaign to inform high-school students and parents of the value of their courses.

The number of enrolments in home study courses and short courses remained high: 544 in the home study program and 1722 at the Farmer Education Centres.

TRAINING

General

Almost 1200 staff members attended 46 formal training and development programs conducted by the Department. These covered 23 topics, including principles of supervision, legal training, communication and assertiveness skills, computing awareness/skills, recruitment/selection procedures, and public relations.

Departmental officers were given career counselling, and particular emphasis was placed on provision of skills in 'job seeking' to staff employed under the CEP, Australian Traineeships, YES, and Technical Jobs for Women schemes.

Communication skills

The Communication Skills Workshops concentrated on teaching skills in public speaking, writing and using electronic media. Participants were filmed during their public speaking exercises for later critical reviewing, and the course emphasised development of confidence and competence. The writing segment developed officers' skills in presenting clear and concise articles for general publication and media release. Confidence in front of a television camera was another objective achieved by participants at the workshops.

A survey of communication training needs carried out during the year led to development of programs specific to group and personal communication. These will be provided as one or two-day specific-skills workshops.

Veterinary staff

Senior field veterinarians attended a series of workshops designed to improve their technical and management skills. Topics covered included use of computers, epidemiology, statistics, flock management and economics, field investigations, and project management.

The Department provided financial support for five officers to study for the

degree of Doctor of Philosophy, two of them at universities in the USA. Nine officers received support for studies towards masters degrees, in various disciplines. Two management courses were held at the Veterinary Laboratories, Glenfield: one for supervisors and one for senior staff.

GROUP ACTIVITIES UNIT, COWRA

The Group Activities Unit provides the secretariat for the Agricultural Bureau of NSW and the Rural Youth Organisation of NSW.

Agricultural Bureau

The State President of the Agricultural Bureau in 1986–87 was Mr R. J. Schofield, a farmer from Humula. Membership for the year totalled 1768 in 67 branches, a 5% increase on 1985–86. This increase was

attributed to the active programs of branches in the Riverina and central west of NSW. Major programs included trees on farms, alternative crops, CALM, sheep management, and crop trials.

Rural Youth Organisation

The State President of the Rural Youth Organisation in 1986–87 was Miss Judy Ryan, an accountant from Bathurst. Membership for the year was 1452 from 67 clubs, a 25% increase on the previous year. Activities included the 52nd Annual Showcamp, the Ampol Top Club Award, the Annual Roundup at Gunnedah, the Annual Conference at Casino and the Major Awards Seminar. New project books produced include *Raising the Dairy Calf*, *Vegetable Growing* and a new *Handbook*.

GRANTS FOR RESEARCH

NEW LEGISLATION

Under recent Commonwealth legislation, Rural Research Councils were established in 1986–87 to replace the Commonwealth Rural Industry Trust Account/Research Committees. Essentially, the Rural Industries Research Bill 1985 replaces all previous schemes with a set of uniform provisions. Similar arrangements apply to the Australian

Meat and Livestock Research and Development Corporation and the Wool Research and Development Fund.

RESEARCH GRANTS

The total research grants to the Department from non-Consolidated Revenue sources in 1986–87 exceeded \$6.5 million. Listed below are the main grants made during the year:

Rural industry research fund

(The cost is shared equally by producers and the Commonwealth Government)

	\$
Australian Meat and Livestock Research and Development Corporation	348,683
Barley Research Committee for NSW	257,726
Barley Research Council	209,125
Chicken Meat Research Council	2,950
Cotton Research Council	293,436
Dairy Research Council	80,322
Dried Fruits Research Council	4,500
Fishing Industry Research Committee	915,663
Grain Legumes Research Council	3,130
Honey Research Council	32,699
Oilseeds Research Council	110,297
Pig Research Council	91,955
Poultry Research Council	33,300
Tobacco Trust Account	32,300
Wheat Research Committee for NSW	1,110,977
Wheat Research Council	454,318
Wool Research and Development Fund	809,940
TOTAL	4,791,321

Miscellaneous grants

Miscellaneous grants were awarded from: Water Research Foundation of Australia Ltd (\$2,500); Horticulture Stock and Nurseries Act Account (\$42,500); Apple and Pear Research Foundation (\$1,270); Australian Macadamia Society (\$5,730); Processing Tomato Research Committee (\$14,000); Australian Special Rural Research Fund (ASRRF) Matching Grants (\$62,271); Australian Water Research Advisory Council (\$177,000); Federal Water Research Advisory

Program (\$201,000); Innovative Agricultural Marketing Program (\$62,400); Horticultural Quarantine Research (\$49,151); Australian Special Rural Research Fund (\$153,175); Rice Research Committee (IREC) (\$227,278); Rural Credits Development Fund (\$125,620); Swine Compensation Fund (NSW) (\$81,450); and Australian Centre for International Agricultural Research (221,872). There were also donations from marketing boards, special interest groups and private companies.

MARKETING AND ECONOMIC SERVICES

FARM RESOURCE MANAGEMENT PROGRAM

The priority program on farm resource management focused on providing economic and marketing information to farmers and on improving farmers' management skills. Workshops allowed farmers to assess their farm performance and highlighted alternative financial, management and enterprise options; information on rural assistance was coordinated and distributed; the economic content of technically-based meetings for farmers was increased; and the adjustment needs of farmers in the sugar and rice industries, and in irrigated agriculture, continued to receive attention.

MARKETING SERVICES

Agricultural statistics

The computerised news bulletin *CSU News*, which is disseminated through the Department's computer network, was significantly improved.

A national contact network on agricultural statistics was established by Standing Committee on Agriculture to coordinate the collection, distribution and use of agricultural statistics in Australia. The Department's Central Statistics Unit was made convenor of this group. The Unit also helped review the format and content of the Agricultural Census, and to develop and implement systems for electronic delivery of information.

Marketing advice

The Marketing Unit's services to agricultural and fishing industries included advisory projects on future directions for cooperatives, organisational options for groups of

producers and the market potential for grain legumes. The Unit also gave business marketing advice to several groups of producers, and to marketing boards and cooperatives. The Unit's role is to facilitate and coordinate action by industries and educational institutions aimed at organising, planning for, and taking advantage of, opportunities to market produce.

Commodity intelligence

Price reporting was further extended through coverage by the Glen Innes sheep and lamb report and a weekly wholesale lamb report from the Homebush Meat Halls. Livestock prices were reported from nine cattle, ten sheep, and two pig markets, and horticultural prices reported from the Flemington Markets.

The outlook for crop, livestock and horticultural commodities was monitored and current and emerging issues analysed. An industry-funded study tour of Europe and Asia was undertaken to determine grain trade flows and prices for grains, particularly oats. Issues examined during the tour included closer economic relations between Australia and New Zealand, US agricultural policy, and the European Community's common agricultural policy.

Market prices and industry situation and outlook information were reported through regular radio items, newspapers, recorded message facilities, *CSU News*, and through commercial electronic data services.

ECONOMIC SERVICES

Policy analysis

A major commitment for the Economic Services Branch in 1986–87 was the preparation of submissions to the Royal Commission into Grain Storage, Handling and Transport, and to the Industries Assistance Commission Inquiry into Wheat Marketing.

The Branch also analysed aspects of industry structure and performance, including a study of the financial returns to research and development in the wool industry, and the financial performance of the oyster industry. Pricing arrangements were investigated through studies of the range in prices for several types of fish, and of variations in prices for lamb. Marketing arrangements were the subject of special studies in the dairy and prime-lamb industries.

Important research was carried out on economic aspects of conservation farming (including minimum tillage), soil acidity, salinity and landforming. Research also continued on the adjustment needs of the rice, sugar and grapegrowing industries, in addition to the major research program on the grains industries.

The role of government regulation and funding was reviewed in several industries and areas including land tenure, water use and production in irrigated areas, farm inspection for public pest control, and public investment in wheat breeding.

Production economics

Through sectoral and inter-sectoral studies of agriculture and related industries, the Branch evaluated changes in technology, alternative enterprises and management strategies in a dynamic economic environment. This research provided specialist support for the Department's research and advisory services.

The economic impact of alternative technologies was considered in relation to a range of projects, including varietal change and quality in Australian wheats, production technology in the pig industry, minimum tillage and other cultivation practices in northwestern NSW, the use of fire and goats for scrub control in the Western Division, hydroponic lettuce-production systems, and the use of on-farm grain storage by farmers. Prices for agricultural products, and the impact of technological change on productivity of improved pastures on the

central and southern tablelands of NSW, were also studied.

The Branch examined the economics of a number of enterprises, including cropping versus livestock production, the development of citrus and stone-fruit orchards, dual-purpose crops such as oats, certified potato seed production, and forage exports. Gross margins budgets handbooks were produced for various enterprises across the State as a useful complement to more detailed studies.

Several management strategies for farmers were investigated during the year. Using whole-farm spreadsheet models, regional economists evaluated alternative farming systems, and integration of enterprises into these systems, in both dryland and irrigated agriculture.

Alternative marketing strategies for wheat and cotton producers were examined, as was the feasibility of using US commodity futures contracts for hedging Australian cotton and oilseeds production.

Farm management information

Information was disseminated to farmers to help them make farm management decisions under changing economic circumstances. This included articles on specific topics (such as rural finance and enterprise change) and articles and talks on management methods such as improved record-keeping systems.

To help the effective dissemination of economic and marketing information and research results, printed and computerised publications were issued. Regular publications included *CSU News*, *Review of Marketing and Agricultural Economics*, *Commodity Bulletin*, *Agricultural Economics Bulletin*, statistics handbooks and regional budget booklets. Agfacts and Miscellaneous Bulletins were also produced.

EXPORT DEVELOPMENT

Against the backdrop of declining terms of trade, the Export Development Unit was established in 1984 to stimulate the development of NSW agricultural exports. The Unit was structured around the appointment of a consultant, Mr Westbrook Haines, as its Executive Director. In May 1985 the Advisory Officer (Export Development), Mr Nobuhiko Sugimoto, was appointed to the Unit to specialise in

development of the Japanese export market and to facilitate Japanese investment. These appointments brought a wealth of experience in international trade into the Department.

Trade visits

Since its establishment, the Unit has organised 16 visits by major international trade concerns. The object of the visits was to inform NSW producers about overseas market requirements and to boost export production. The visits also sought to raise the profile of our export industries within the State's target markets by familiarising key traders with our productive capacity. The main visits in 1986-87 were:

- Fruit Transitokantoor (FTK) Ltd, Rotterdam, The Netherlands (horticultural importer)
- Alrava-France, Perpignan, France (horticultural importer)
- Hunter Produce Ltd, Faversham, England (horticultural importer)
- Marks and Spencer, London, England (horticultural retailer)
- Selective Enterprises Inc., Los Angeles, USA (lamb importer)
- Nisseikyo Association, Tokyo, Japan (horticultural importers association)
- Yamada Company, Tokyo, Japan (horticultural importer)

Overseas market investigations

The Unit regularly visits international markets to investigate export opportunities for NSW producers and to examine transport, distribution and other aspects of industry infrastructures overseas. During 1986-87 the Unit visited North America twice, New Zealand once and Europe once. It also participated in the Australian Investment Mission to Japan led by the Commonwealth Minister for Industry, Technology and Commerce, Senator John Button. The visits identified many export opportunities in horticulture, sheep meats, goat meats and processed food products.

Industry bodies

The Export Development Unit is an 'umbrella' body for the NSW Horticultural Export Development Council and the NSW Fish Export Committee. It also services the Marketing and Economics Committee of the Australian Macadamia Society and is represented on the Australian Airfreight Council. These bodies met throughout the

year and took initiatives to foster a planned approach to export development by the various rural industries concerned.

In January 1987 the Minister for Agriculture, Lands and Forests established the NSW Goat Industry Development Council, representing producer, exporter, marketing and investment interests. The formation of the Council implements recommendations submitted in the Report of the NSW Goat Marketing Development Task Force in April 1986. The Council's objectives are to encourage government, and producers and other areas of the private sector, to invest in production and marketing of goat products with a view to expanding exports from NSW and from Australia generally.

Export product developments

The Unit has identified market opportunities and facilitated commercial activities for a wide range of products. These include horticultural products (especially ornamental plants, cut flowers and nuts), Murray Grey Cattle, goat products (fibre, meat and skin), grain legumes, stockfeed, fish products, sheep meats (lamb and mutton), deer products, and processed foods. The most rapidly developing export areas are as follows:

- **Horticulture.** This was the first industry targeted for development. The Unit's strategy has been to develop Australia's opportunities to supply northern hemisphere markets when the local product is out of season, and to take advantage of new consumer demand for exotic fruits. In 1984, the set objective was to increase NSW horticultural exports from \$25 million to \$100 million within four years. This objective is now considered conservative.
- **Murray Grey cattle.** The Unit assisted other specialists in the Department and the Australian Murray Grey Cattle Society to further develop the export trade in Murray Grey cattle to Japan. About 75% of the national herd is located in NSW and the national figures index the trade growth. The Murray Grey trade to Japan grew from nil in 1983 to 1000 head in 1984 and 3000 head in 1985. This year it reached 7000 head.

- **Goat products.** International demand is high for cashmere and mohair fibres, goat meat, skin products and live animals. Over the last three years the NSW goat population has grown from under 150 000 to around 300 000. It is estimated that the NSW industry could return an additional

\$250 million in annual export income within 10 years. Returns are also available on the domestic market for goat milk and cheese, and a range of specialist by-products, such as blood plasma, is being developed.

OVERSEAS PROJECTS

The Overseas Projects Section is responsible for the administration and management of the Department's overseas activities in agricultural development projects. These activities, which range from short-term specialist consultancies of one to 24 weeks up to longterm assignments of one to two years, involve professional staff in assignments such as project feasibility studies, planning and design studies, project reviews and the conduct of collaborative research.

Funds for short-term assignments in 1986–87 were provided by sponsoring bodies as follows:

- The Australian Centre for International Research (ACIAR) funded 14 assignments to Malaysia, Thailand and Papua New Guinea for a total of 179 days. All assignments were related to ACIAR-funded collaborative research projects between the NSW Department of Agriculture and research institutes and universities in the developing countries.
- The United Nations funded two short-term assignments in India and Thailand for a total of 48 days. One assignment was a workshop on measurement of biological fixation of nitrogen in legumes, the other was a consultancy to assist in the development of an agriculture-based perfume industry.
- Australian Development Assistance Bureau (ADAB) funded three short-term assignments: two to Thailand for a total of 60 days to establish a goat breeding project, and one to the People's Republic of China for 27 days to develop an agricultural laboratory.

- Private organisations funded two short-term assignments: one to Malaysia/Thailand for 17 days for a feasibility study on a joint vegetable growing venture, and one to Indonesia for 19 days to provide specialist advice on post-harvest storage and transport of vegetables.

One longterm project, established during the year in Guangdong Province in the People's Republic of China, is funded by the Guangdong Provincial Government. Its objective is to help establish pasture and cattle production in an area formerly regarded as wasteland. Two departmental specialists and their families are undertaking two-year residential assignments on the project.

In addition to overseas activities, the Section also arranged itineraries in agriculture for official visitors from USSR, Thailand, Japan, Mongolia, Canada and the People's Republic of China.

Training programs were conducted for three postgraduate horticulturists, sponsored by the Food and Agriculture Organisation (FAO) of the United Nations, for 12 weeks; and for five Chinese animal husbandry and agronomy technicians, funded by the Guangdong Provincial Government, for eight weeks.



SUPPORT SERVICES

OFFICE OF THE MINISTER FOR AGRICULTURE, LANDS AND FORESTS

The correspondence system for the Minister's Office was computerised to cope with the additional correspondence following the increase in responsibilities given to the Minister for Agriculture, Lands and Forests. Ministerial press releases are now issued through the Telex Operating System (TOS) on the Department's Prime computer.

PERSONNEL AND STAFFING SERVICES

The Department's Equal Employment Opportunity Management Plan was accepted by the Director of Equal Opportunity in Public Employment. Grievance procedures and the policy on discriminatory harassment were formulated and distributed to all staff. The Department's initial *Ethnic Affairs Annual Report* was prepared and accepted by the Ethnic Affairs Commission. Complaints about discrimination were investigated in confidence and counselling was provided for staff throughout the State. Where necessary, officers were referred to specialised external agencies.

In association with the Commonwealth Department of Community Services, the Department of Agriculture conducted a Work Therapy Scheme which provided short-term training opportunities for people with a disability. One disabled person was given permanent appointment after training under this scheme. The Department also continued to participate in the Aboriginal Tertiary Training Scheme conducted by the NSW Public Service Board. One Aborigine was appointed permanently under this scheme. A further 20 Aboriginal apprentices were employed under the Training for Aborigines Program.

Steady progress was made in computerisation of records for staffing and establishment. New programs will provide management with regular information on such matters as personnel statistics, staff strength and vacancies, and salary expenditure. A program written to provide for automatic preparation of 80% of the Department's salary estimates will result in substantial savings in clerical work. Other modifications and enhancements were also completed, making the system more readily

accessible to inquirers and providing more relevant reports. Much of the recruitment process and the procedures for recording of salary increments were converted from manual to fully computerised operation. This will further reduce the clerical workload.

SPECIAL EMPLOYMENT SCHEMES

A number of special employment programs were again supported by the Department in 1986-87. These were aimed at providing vocationally based skills to disadvantaged groups within the community.

The Department's contribution to the new Australian Traineeship System (ATS) commenced in August 1986 with the employment of a group of 34 trainees under the office assistant category.

The ATS is aimed specifically at providing training and employment opportunities to unemployed youth through concurrent formal courses at TAFE Colleges and on-the-job experience with the Department.

Community Employment Program (CEP). A third round of CEP projects was completed in December 1986. It provided 640 jobs at a cost of about \$7,155,000. The projects included:

	\$
John Macarthur Agricultural Institute	800,000
Fisheries Research Institute, Cronulla	443,000
Seven projects in the Sydney Metropolitan Area	893,000
Eight projects in the Parramatta area	721,000
One project in the South Sydney area	56,000
Eight projects in Region 1	1,337,000
Fourteen projects in Region 2	1,572,000
Four projects in Region 3	174,000
Ten projects in Region 4	795,000
Six projects in Region 5	364,000
TOTAL	7,155,000

State Government Departments were excluded from participating in a fourth round of CEP in 1987.

Youth Employment Scheme. The Department was allocated the following funds under the Youth Employment Scheme (YES):

	\$	Jobs
September 1986 intake	349,000	59
February 1987 intake	77,000	12
May 1987 intake	702,000	112



Robyn Convoy (right), employed under the CEP program, takes a break from work on renovations to a building at the Fisheries Research Institute, Cronulla.

Technical Jobs for Women. In October 1986, approval was given for the employment of 14 trainee computer programmers and four trainee technical officers under the 1987 intake of the program. A fifth technical officer traineeship was approved in December 1986. All positions were filled.

The initial allocation for this program in 1987 was \$336,000.

MANAGEMENT AUDIT

The Management Audit and Analysis Branch completed 25 financial, administrative and operational audits. In addition, officers of the Branch conducted a number of comprehensive reviews to evaluate procedures, investigate issues and make recommendations for operational improvement. These included a review of motor vehicle usage; formulation of guidelines on accrual accounting for financial statements of Pastures Protection Boards; and a review of the administrative operations of C. B. Alexander Agricultural College at Paterson.

Specific financial or operational evaluations were carried out for the Agricultural Bureau of NSW, the Rural Youth Organisation, and the Agricultural Scientific Collections Trust.

The Branch commenced training of staff in procedures for auditing computerised systems.

INDUSTRIAL RELATIONS

Several award claims affecting departmental staff were finalised during the year. A judgment was handed down on the Public Service Association's claim for a Crown Employees (Scientific Section, Fisheries Division, Department of Agriculture—Relocation Compensation) Award. Officers affected were extended the benefits of the Crown Employees (Transferred Officers' Compensation) Award and the Excess Rent Agreement. Following negotiations, lecturers at the Department's agricultural colleges were included under the Scientific Officers' Agreement. Variations were also made to camping and motor vehicle allowances. The Public Service Association has also actively pursued the issue of permanency for all groups within the Department not afforded that status—in particular, Ministerial employees within the Board of Tick Control.

Following a request from the Premier to all Ministers to identify and reduce restrictive work and management practices, a committee was formed to identify practices within the Department that could be altered to promote a more effective and efficient workforce. All major unions and senior departmental staff contributed to the review, and a report was forwarded to the Public Service Board in June 1987.

Staff from the Industrial Section visited more than 30 regional establishments during the year to discuss industrial issues with staff and management.

SAFETY AND OCCUPATIONAL HEALTH

During the year the Safety and Occupational Health Unit advised management, staff and the various departmental safety committees on matters relating to safety in the workplace. Officers of the unit visited numerous departmental units during the year to conduct safety audits, safety training and fire drills, and to advise on matters relating to the Department's accident prevention program. A fire at the Agricultural Research Station at Narrabri was investigated.

The training given to supervisors and staff on repetitive strain injury (RSI) during the previous year proved most successful. The number of reported cases was reduced to four and no cases were reported in the latter half of the financial year. An RSI Management Plan was prepared in accordance with the requirements of the Public Service Board.

PERFORMANCE, MANAGEMENT AND STRATEGY REVIEW

In line with the Government's desire to improve the standard of management and quality of service in the public sector, the Department started development of performance indicators and evaluations. A five-year plan for reviewing and evaluating major programs and activities was prepared.

In accordance with the Department's management improvement plan, the policies, procedures and systems relating to allocation of staff resources were reviewed and improved. Mechanisms for approval were streamlined, with authority being delegated more widely and standardised forms being introduced. The staff establishment computer program was extensively rewritten, stored records were audited for accuracy, and the

management reporting system was revised to allow more accurate monitoring of staffing and associated financial expenditure.

SENIOR STAFF CHANGES

Dr C. Gellatly was appointed Executive Director (Policy and Services) following the retirement of Mr J. E. Jessup.

Mr J. Booth was appointed Chief, Division of Marketing and Economic Services.

Dr P. J. Mylrea was appointed Chief, Division of Animal Health.

Dr D. Francois, Executive Director (Fisheries), proceeded on pre-retirement leave.

Dr P. Ayres, Chief, Division of Fisheries, resigned on 5 June 1987.

Mr R. Claxton, formerly Chief, Division of Plant Industries, was appointed Deputy Director of the Department of Water Resources.

CONSULTANTS

Consultants are contracted when staffing resources are unavailable (e.g., computer programmers) or where it is considered essential to use people with specific skills or extensive experience in particular areas (e.g., engineering works). The following consultants were engaged by the Department during the year:

Price Waterhouse and Urwick

Des Thwaites and Associates

Peter Allen

Innovative Software Pty Ltd

Nextra Computer System

John D. Moffat, Merimbula

Bailey, Davis and Associates

Philip Cox, Richardson, Taylor and Partners Pty Ltd

Mr G. Yabsley

Dominguez Barry Samuel Montagu Ltd

Mr W. Haines

Mr N. Sugimoto

Hugh, Truman and Ludlow

Thorn-EMI

Mitsui Computer Systems Pty Ltd

SMS Pty Ltd

George H. Clark and Associates

Sinclair Knight and Partners

L. M. Technical Services Pty Ltd

Centrecom Data Entry Pty Ltd

Dr W. A. Davis (Conference Management Associates Pty Ltd)

OVERSEAS TRIPS

The majority of overseas visits were funded by the relevant industry. Consolidated funds were used only for visits undertaken by Messrs G. R. Gregory (Trade Mission to Japan), O. R. Southwood (arid zones studies), B. D. Scarsbrick (Thailand Trade Mission), and R. J. Smith (planning and environment studies). Partial consolidated funding was provided to assist Messrs R. J. Williams and G. K. Bolla. Mr D. Stent paid his own way.

Reports have been submitted in all cases. Officers undertaking visits funded by industry also prepared detailed reports for circulation to the relevant industry. Where it was appropriate for recommendations to be prepared and where the study concerned a specific field of research, those recommendations were dealt with regionally and divisionally unless departmental policy was involved.

N. W. Wratten, Rapeseed Breeder—Europe, 5 days, to attend 7th International Rapeseed Congress in Poland on 5 May 1987.

E. Capps, Fisheries Microbiologist—NZ, 5 days from 18 May 1987 to attend Combined New Zealand and Australia Microbiology Conference.

B. Read, Quarantine Entomologist—Singapore/Sydney, 4 days from 18 May 1987 to check aircraft disinfection procedures.

R. Fitzell, Senior Plant Pathologist—South Africa, 4 weeks from 29 April 1987 to attend World Avocado Congress and investigate new technology in storage, handling and export of avocados.

D. Stent, Manager, Short Courses—UK, 3 months from 4 May 1987 to investigate improved agricultural education methods and organisation.

T. D. Mitchell, Special Livestock Officer (Goats)—China, 3 weeks from 25 April 1987 to investigate new techniques of cashmere breeding, production and processing.

I. E. Embury, District Livestock Officer (Poultry)—France and Thailand, 4 weeks from 18 April 1987 to investigate goose production, processing and marketing.

G. R. Robards, Deputy Chief, Division of Animal Production—NZ, 5 days from 1 February 1987 to attend 4th Annual Scientific Congress of the Asian/Australian Association of Animal Production.

R. J. Barlow, Senior Research Scientist—NZ, 5 days from 1 February 1987 to attend 4th Annual Scientific Congress of the Asian/Australian Association of Animal Production.

G. R. Gregory, Deputy Director-General—Japan, 7 days from 11 May 1987. Accompanied Trade Mission organised by Company Directors Association of Australia.

B. D. Scarsbrick, Regional Director of Agriculture—Thailand and Malaysia, 14 days from 11 April 1987 to accompany NSW Trade and Economic Mission.

A. D. Shannon, Principal Veterinary Officer—UK, 14 days from 16 February 1987 to attend University of London course 'Modern Immunocytochemistry—Current Advances in Laboratory Techniques'.

P. J. Holst, Senior Research Scientist—Brazil, 24 days from 3 March 1987 to attend 4th International Conference on Goats and investigate production, processing and marketing of goat skins.

G. K. Bolla, Livestock Officer (Poultry)—Holland and UK, 28 days to study the latest developments in design and operation of poultry housing and equipment.

A. K. Sheridan, Senior Research Scientist—Canada and Europe, 28 days from 16 May 1987 to attend 2nd International Conference of Quantitative Genetics and investigate methodology used in Boar Performance Testing Program.

R. J. Smith, Regional Liaison Officer—NZ, 5 days from 26 January 1987 to attend 56th ANZAAS Congress (particular interest in papers relating to agriculture and the environment and to controls on land-use planning).

B. A. Auld, Senior Research Scientist—USA, 19 days from 24 January 1987 to attend Symposium of Weeds Society of America, present the Wright lecture at Purdue University and investigate latest developments in mycoherbicide research.

D. C. Harris, Special Livestock Officer (Prime Lamb Production)—NZ, 14 days from 2 March 1987 to investigate all aspects of lamb production and marketing, including genetics, nutrition, management, livestock appraisal and processing.

N. M. Fogarty, Special Livestock Research Officer—NZ, 14 days from 2 March 1987 to investigate all aspects of lamb production and marketing, including genetics, nutrition, management, livestock appraisal and processing.

A. Nikandrow, Special Plant Pathologist—USA, 4 weeks from 8 March 1987 to undertake cooperative research on mycoherbicides at the University of Arkansas.

R. Mailer, Chemist (Oilseeds)—Canada and Europe, 23 days from 5 May 1987 to attend International Rapeseed Conference and visit rapeseed breeding institutions discuss quality and analytical techniques in rapeseed.

G. A. Taylor, Livestock Officer (Pigs)—UK, 6 weeks from 27 April 1987. Study/training period with the advisory services of the United Kingdom Ministry of Agriculture, Fisheries and Food.

D. F. Herridge, Special Bacteriologist—Thailand, 6 days from 17 November 1986 to attend the International Atomic Energy Agency coordination meeting on Breeding Legumes for Enhanced Nitrogen Fixation.

N. R. Baker, Special Economist (Commodities)—Western Europe and Indonesia, 28 days from 31 October 1986 to carry out commodity investigations and obtain commodity intelligence and sources for the Oats Marketing Board of NSW, and to attend World Grain Congress.

P. Stace, Livestock Officer (Apiculture)—NZ, 5 days from 31 October 1986 to study use of honeybees in pollination of macadamias and kiwifruit and investigate chalk brood disease of bees.

P. Barkley, Senior Research Scientist—Spain, 14 days from 8 November 1986 to represent Australia at the 10th Conference of the International Organisation of Citrus Virologists and investigate sources of supply of new varieties of citrus for NSW growers.

A. Casey, District Livestock Officer (Sheep/Beef)—Japan, 14 days from 1 October 1986 to supervise livestock transport and initiate Joint NSW/Tokyo Metropolitan Government Murray Grey Cattle Trial.

E. S. Batterham, Principal Research Scientist—Thailand, 10 days from 1 September 1986 to attend International Workshop on Improvement and Utilisation of Food Legumes for Asian Farming Systems, sponsored by ACIAR, and evaluate ACIAR pigeon pea breeding program at Chang Mai University.

B. E. Wallbank, Special Entomologist—Israel, Switzerland and USA, 28 days from 17 September 1986 to attend 4th International Working Conference on Stored Product Protection, and visit chemical companies and government laboratories undertaking research into resistance of insects to grain protectants.

D. G. James, Entomologist—USA, 10 days from 25 August 1986 to attend 2nd International Conference on Monarch Butterfly and establish cooperative research into the importance and biological control of phytophagous mites in orchard crops.

R. J. Williams, Senior Fisheries Biologist—USA, 28 days from 16 September 1986 to attend International Oceans 1986 Marine Resources Conference and visit marine resources research institutions in the USA.

B. L. Wild, Senior Research Horticulturist—Japan, 7 days from 5 August 1986 to examine the pathology and physiology of a shipment of citrus from the MIA and report to producers and importers.

G. Baker, Senior Entomologist—Europe, 14 days from 17 August 1986 to attend 4th International Colloquium of Invertebrate Pathology in Holland and the 18th International Nematology Symposium in France.

J. Pepperell, Senior Marine Biologist—New Caledonia, 14 days beginning 29 July 1986 to attend meeting of scientists involved with the South Pacific Commission Tuna and Billfish Program.

R. Callinan, Veterinary Research Officer—Thailand, 5 days from 5 August 1986 to attend Workshop on Ulcerative Diseases of Fish.

I. Bell, Veterinary Research Officer—Malaysia, 8 weeks from 6 August 1986 to conduct Newcastle Disease vaccination trials with poultry.

A. R. Gilmour, Special Biometrician—USA, 20 days from 13 July 1986 to attend 3rd World Congress on Genetics Applied to Livestock Production and the 13th International Biometrics Conference.

A. D. Clift, Senior Research Scientist—USA, 3 weeks from 13 July 1986 to attend International Symposium on Scientific and Technical Aspects of Cultivated and Edible Fungi and the VIth North American Mushroom Conference, and investigate new technology in mushroom production.

E. J. Knights, Research Agronomist—USA, 7 days beginning 4 July 1986 to attend International Food Legume Research Conference.

P. B. Hughes, Research Scientist—United Kingdom, 7 days from 8 July 1986 to attend Symposium on Fundamental and Practical Approaches to Combating Insecticide Resistance.

D. F. Herridge, Special Bacteriologist—USA, 7 days from 6 July 1986 to attend International Food Legume Research Conference.

N. M. Fogarty, Special Livestock Research Officer—USA, 7 days from 16 July 1986 to attend 3rd World Congress on Genetics Applied to Livestock Production.

O. R. Southwood, Regional Director of Agriculture—USA, 30 days beginning 15 July 1986 to study advisory and research programs pertaining to conservation farming of arid and semi-arid rangelands

L. W. Valentine, Principal Veterinary Officer—USA, 5 days from 27 October 1986 to attend Joint FAO/WHO Food Standards Programme for Codex Committee on Residues of Veterinary Drugs in Foods.

I. G. Ferris, Senior Chemist (Pesticides)—UK and Canada, 35 days from 1 July 1986 for 3 weeks' collaborative research in the UK and to attend International Pesticide Congress in Canada.

S. M. Wheeler, Special Livestock Research Officer—Europe, 28 days from 11 July 1986 to attend 5th International Symposium on Iodine and Other Trace Elements and investigate research into effects of fluorides on pastures and animals.

B. Read, Senior Research Agronomist—Japan, 10 days from 6 October 1986 to attend 5th International Barley Genetics Symposium and investigate new technologies in barley genetics and breeding.

G. M. Murray, Senior Plant Pathologist—Europe and USA, 28 days from 10 October 1986 to attend postgraduate course on 'Simulation and Systems Management in Crop Protection' in Holland and discuss pest and disease management in the USA.

K. B. Bevington, Senior Research Horticulturist, and J. B. Forsyth, Principal Horticulturist (Citrus)—China, 21 days from 14 October 1986 to participate in citrus mission to China as part of the program approved under the Australia–China Agricultural Cooperation Agreement.

R. J. West, Fisheries Habitat Biologist—Thailand, 5 days from 9 December 1986 to attend UNESCO regional seminar 'Brackish Water Ecosystems with Emphasis on Conservation and Management of Resources'.

G. H. Knowles, Director-General—China, 14 days from 8 September 1986 to participate in 2nd Meeting of Australia–China Joint Agricultural Commission.

B. P. Walsh, Lecturer in Farm Management—Europe, 28 days from 23 August 1986 to attend 15th International Course on Vocational Education and Teaching in Agriculture.

A. S. Hodgson, Senior Research Agronomist—Europe, 28 days from 11 August 1986 to attend 13th International Congress of Soil Science and investigate soil and soil management research in Europe.

J. B. Forsyth, Principal Horticulturist (Citrus)—USA, 28 days from 30 July 1986 to attend 2nd Congress of the International Society of Citrus Nurserymen and investigate citrus production and research in California.

J. C. Evans, Special Biometrician—USA, 5 days from 28 July 1986 to attend 13th International Biometrics Conference.

N. W. Forrester, Senior Entomologist—Europe, UK and Thailand, 30 days from 28 June 1986 to attend IVth Congres sur la protection de la sante humaine et des cultures en milieu tropical; a symposium on fundamental and practical approaches of combating insect resistance to insecticides; and to investigate research of pyrethroid resistance.

G. P. Lamont, Research Horticulturist—Japan and USA from 5 August 1986 to attend XXIIInd International Horticultural Congress and study research being conducted on ornamental plants and nursery stock.

J. A. Murison, C. R. Beckingham, D. O. Huett, A. Hele, Q. V. Nguyen and R. J. Hutton—USA, 12 days from 10 August 1986 to attend XXIIInd International Horticultural Congress.

STAFFING STATISTICS

Summary of staff in established positions by programs

Description	No. of Staff
Horticulture	357
Plant Quarantine + Export Services	144
Extensive Animal Industries	347
Animal Health Services	439
Marine Fisheries Regulatory and Management	95
Marine Fisheries Research and Development	99
Inland Fisheries Regulatory and Management	42
Inland Fisheries Research and Development	38
Technical Services	263
Education	110
Agricultural Services Grant	2
Marketing Services	37
Economic Services	34
Overseas Projects	9
Administration	167
Field Crops & Pastures	716
Intensive Animal Industries	55
TOTAL	2 954

Staff Statistics as at 30 June 1987

	1.	2	Region*		5	O	Other	Total
			3	4				
Administration	20	14	12	16	16	192	—	270
Plant Industries	52	124	39	61	116	372	—	764
Animal Health & Production	64	107	41	76	57	178	—	523
Agricultural Services	132	268	79	157	270	127	—	1 033
Cattle Tick	98	—	—	1	—	—	—	99
Fisheries	26	39	5	26	22	122	25	265
SUBTOTALS	392	552	176	337	481	991	25	2 954
Technical Jobs for Women	3	3	1	1	5	13	1	27
National Employment Strategy for Aboriginals (NESA)	8	3	—	2	6	1	1	21
Community Employment Program	—	26	—	3	2	38	—	69
Youth Employment Scheme	15	35	4	15	4	10	—	83
NESA Apprenticeships	3	—	1	—	1	—	—	5
Australian Traineeships	5	4	1	5	3	9	—	27
SUBTOTALS	34	71	7	26	21	71	2	232
Ministerials—Board of Tick Control							186	186
—Prickly-Pear Destruction Commission							33	33
SUBTOTALS							219	219
TOTALS	426	623	183	363	502	1 062	246	3 405

These figures represent staff numbers employed as at 30 June expressed in full-time equivalent; there were also 311 vacant positions.

* See map, page 7. O = Metropolitan.

Four-year comparison of staff numbers employed as at 30 June each year, by category

	June '87	June '86	June '85	June '84
Administration	270	284	266	270
Plant Industries	764	705	707	683
Animal Health & Production	523	649	708	808
Agricultural Services	1 033	1 022	1 064	1 081
Cattle Tick	99	100	93	98
Fisheries	265	257	234	183
SUBTOTALS	2 954	3 017	3 072	3 123
Special employment schemes	232	498	203	725
Ministerials—Board of Tick Control	186	209	217	241
—Prickly-Pear Destruction Commission	33	37	38	38
SUBTOTALS	219	246	255	279
TOTALS	3 405	3 761	3 530	4 127

LEGAL SERVICES

Overseas legal training

The Chief Legal Officer, together with a veterinarian and a quarantine inspector, conducted five legal training courses for regulatory inspectors in Papua New Guinea to improve the regulatory performance of their stock disease and quarantine staff.

General

General activities undertaken by Legal Branch under State Acts were: 156 summonses issued (these do not include summonses under the Fisheries and Oyster Farms Act 1935); 16 proclamations; 6 notifications; 61 gazettals of appointments orders and miscellaneous notices; and 6 Agricultural Holdings Act disputes arbitrated.

Main Acts concerned with regulatory activities

Commonwealth Acts. Quarantine Act 1908, Export Control Act 1982, Fisheries Act 1952.

State Acts. Agricultural Holdings Act 1941, Agricultural Scientific Collections Trust Act 1983, Apiaries Act 1985, Banana Industry Act 1987, Biological Control Act 1985, Canned Fruits Marketing Act 1979, Cattle Compensation Act 1951, Dairy Industry Act 1979, Dried Fruits Act 1939, Egg Industry Act 1983, Farm Produce Act 1983, Fisheries and Oyster Farms Act 1935, Fertilizers Act 1985, Grain Handling Act 1954, Horticultural Stock and Nurseries Act 1969, Marketing of Primary Products Act 1983, Meat Industry Act 1978, Noxious Insects Act 1934, Pastures Protection Act 1934, Pesticides & Allied Chemicals Act 1978, Plant Diseases Act 1924, Potato Growers Licensing Act 1940, Poultry Meat Industry Act 1986, Poultry Processing Act 1969, Prickly Pear Act 1924, Registration of Stock Brands Act 1921, Seeds Act 1982, Stock (Artificial Insemination) Act 1948, Stock (Chemical Residues) Act 1975, Stock Diseases Act 1923, Stock Foods and Medicines Act 1940, Swine Compensation Act 1928, Sydney Market Authority Act 1968, Tobacco Leaf Stabilisation Act 1967, Veterinary Surgeons Act 1986, Wheat Marketing Act 1984, Wine Grape Processing Industry Act 1979.

Summary of legislative changes

The following regulations were gazetted:

Regulations	Gazetted
Farm Produce Act 1983	2
Fisheries & Oyster Farms Act 1935	26
Justices Act 1902	1
Marketing of Primary Products Act 1983	1
Meat Industry Act 1978	3
Noxious Insects Act 1934	1
Pastures Protection Act 1934	3
Pesticides and Allied Chemicals Act 1978	2
Poultry Meat Industry Act 1986	1
Poultry Processing Act 1969	1
Stock (Artificial Insemination) Act 1948	1
Stock Foods & Medicines Act 1940	2
Veterinary Surgeons Act 1986	2

The following Acts were assented to:

Acts	Assented to
Banana Industry Act 1987	3.6.87
Dried Fruits (Amendment) Act 1987	3.3.87
Farm Water Supplies (Transfer of Functions) Amendment Act 1986	26.11.86
Fisheries and Oyster Farms (Amendment) Act 1987	3.6.87
Grain Handling (Amendment) Act 1987	3.6.87
Pastures Protection (Amendment) Act 1986	17.12.86
Plant Diseases (Amendment) Act 1987	15.4.87
Poultry Meat Industry Act 1986	26.11.86
Search Warrants (Poultry Meat Industry) Amendment Act 1986	26.11.86
Stock Foods & Medicines (Amendment) Act 1986	27.11.86

Minor amendments were included in the Government's Statute Law Revision Program.

Amendments to the following Acts were included in the Statute Law (Miscellaneous Provisions) Act (No. 2) 1986:

- Egg Industry Act 1983
- Fisheries and Oyster Farms Act 1935
- Marketing of Primary Products Act 1983
- Meat Industry Act 1978

Amendments to the following Acts were included in the Statute Law (Miscellaneous Provisions) Act (No. 1) 1987:

- Agricultural Holdings Act 1941
- Egg Industry Act 1983
- Pesticides and Allied Chemicals Act 1978
- Plant Diseases (Amendment) Act 1987

Major changes to Acts administered by the Department and Statutory Authorities were as follows:

Banana Industry Act 1987

The Act was assented to on 3 June 1987 and commenced on that date. The Act repeals and replaces the Banana Industry Act 1969. The Banana Marketing Control Committee is reconstituted as the Banana Industry Committee. The Act clarifies and extends the powers of the Committee to regulate the wholesale marketing of bananas. It also strengthens the constitutional basis of the Committee's power to levy charges by linking them to services provided by the Committee rather than to the quantity of bananas produced by a grower.

Dried Fruits (Amendment) Act 1987

This Act amends the Dried Fruits Act 1939. The amendments require retailers of dried fruits to comply with the packaging and grading requirements of the Act, and also close a loophole in the law.

Following a recent substantial increase in imports of dried fruits from countries such as Turkey and Greece, the Dried Fruits Board has received complaints about quality of some of the imports. The main amendments will ensure that repackers and sellers of dried fruits in NSW comply with the standards applicable to registered packing houses unless exempted by the Board.

Other amendments contained in the Act relate to the appointment of staff by the Dried Fruits Board.

Farm Water Supplies (Transfer of Functions) Amendment Act 1986

The amendments commenced on 26 November 1986 and transferred certain functions from the Water Resources Commission to the State Bank. Other functions relating to the investigation, supervision and carrying out of farm water supply works for irrigation (other than bore water) were transferred from the Water Resources Commission to the Department of Agriculture. The amendments also removed reference to water supply work for domestic or stock purposes from the principal Act; cognate amendments to the Soil Conservation Act 1938 made this function the responsibility of the Soil Conservation Service.

Grain Handling (Amendment) Act 1987

The Grain Handling Act 1954 was amended to remove provisions requiring the Grain Handling Authority to give preference to

wheat; and to require the Authority to handle all kinds of grains on an equitable basis to the extent that it is practicable to do so—having regard to the Authority's resources, facilities and commitments.

The amendment, which ratifies current practice, was supported by all NSW grain boards and the NSW Farmers Association.

Pastures Protection (Amendment) Act 1986

This amendment came into force on 1 January 1987. The main purpose of the Act is to abolish wild dog control boards in the Central and Eastern Divisions of the State and to make further provisions relating to the payment of wild dog scalp bonuses in the Western Division.

Plant Diseases (Amendment) Act 1987

The Act was assented to on 15 April 1987. It amends the Plant Diseases Act 1924 to allow more flexible methods of payment of fees for duties carried out by inspectors and to abolish the requirements for registration of orchards and nurseries. The Act also enables regulations to be made that adopt specified provisions of other Acts by reference to those Acts and to specified standards, rules, codes or specifications prescribed by organisations such as the Standards Association of Australia.

Poultry Meat Industry Act 1986

The Act was assented to on 26 November 1986 and commenced on 13 February 1987. It repeals and replaces the Chicken Meat Industry Act 1977. The Act applies to chickens, but can be extended to cover other poultry—e.g., turkeys. The Chicken Meat Industry Committee is reconstituted as the Poultry Meat Industry Committee. The previous provisions for fixing growing fees that processors must pay to growers remain, but have been generally strengthened. In particular, the new Act makes it easier to prosecute for breaches of the Act and to take civil actions for recovery of growing fees.

Stock Foods and Medicines Act 1986

This Act was assented to on 27 November 1986 and commenced on 27 March 1987. It amends the Stock Foods and Medicines Act 1940 to vary the composition and functions of the Stock Medicines Board; to increase penalties for offences against the principal Act; and to make various other amendments to that Act, relating mainly to the registration and regulation of stock medicines.

FARRER MEMORIAL TRUST

FARRER MEMORIAL RESEARCH SCHOLARSHIP FUND

The Farrer Memorial Trust was established under a set of instructions dated 16 October 1911, to perpetuate the memory of William James Farrer, plant breeder, and to provide encouragement and inspiration to those engaged in agricultural science.

The Trust was initially set up to make periodic awards of a scholarship for 'study or research in agricultural problems', but was later amended to include the delivery of an annual oration and presentation of the Farrer Memorial Medal to a distinguished agricultural scientist for service rendered in the fields of research, education or administration.

The Director-General of the NSW Department of Agriculture, Mr G. H. Knowles, is the Chairman of the Trust. The other official Trustees, by virtue of the position they hold, are: Mr G. R. Gregory, Deputy Director-General of the Department; Professor J. Turner, Dean of the Faculty of Agriculture, University of Sydney; and Dr F. G. Swain, Principal, Hawkesbury Agricultural College. The non-official Trustees representing industry are: Mr G. McCorquodale, Executive Director, NSW Flour Millers' Council; Mr H. R. M. Ross, 'Glengarry', Springside, via Orange; and Mr P. E. B. MacInnes, 'Warringa', Dubbo.

The 1986 Farrer Memorial Medal was awarded to Dr Don Byth, Dean, Faculty of Agricultural Science, University of Queensland. The medal was presented to Dr Byth at a function held at the University of Queensland on 7 August 1986. Dr Byth then delivered the Farrer Memorial oration entitled 'Tropical Crop Legume Improvement—a Matter of Adaptation'.

Mr Brett Summerell, the 1985 Farrer Memorial Scholar, is undertaking research at the University of Sydney for the degree of Doctor of Philosophy. The subject of his research is the effect of physical factors and cultivar type on the decomposition of wheat stubble and its relationship to the survival and ecology of the yellow spot fungus in reduced tillage systems. It is expected that Mr Summerell will complete his research by December 1987.

A donation of \$1,625.20 from the NSW Flour Millers' Council was received to meet part of the scholarship allowance expenditure.

The address of the Trust for correspondence purposes is the Secretary, Farrer Memorial Trust, c/- NSW Department of Agriculture, P.O. Box K220, Haymarket 2000.

TRUSTEES OF THE FARRER MEMORIAL RESEARCH SCHOLARSHIP FUND Auditor-General's Certificate

The accounts of the Trustees of the Farrer Memorial Research Scholarship Fund for the year ended 31 December 1986 have been audited in accordance with Section 34 of the Public Finance and Audit Act 1983.

In my opinion, the accompanying balance sheet, income and expenditure account and funds statement, read in conjunction with the notes thereto, comply with Section 41B of the Act and exhibit a true and fair view of the financial position at 31 December 1986, and transactions for the year then ended.

K. J. Robson, FASA CPA
Auditor-General of New South Wales

Sydney
9 April 1987

Statement in accordance with Section 41B (1) (f) of Public Finance and Audit Act 1983

Pursuant to Regulation 11 of the Public Finance and Audit (Statutory Bodies) Regulation 1985, we state:

- a. the financial statements and notes thereon exhibit a true and fair view of the financial position and transactions for the year ended 31 December 1986;
- b. the financial statements have been prepared in accordance with the provisions of the Act, Regulation and Treasurer's Directions;
- c. we are not aware of any circumstances which would render any particulars included in the financial statements to be misleading or inaccurate.

G. H. KNOWLES
Chairman
Farrer Memorial Trust

Sydney
 9 April 1987

G. R. GREGORY
Trustee

Balance Sheet as at 31 December 1986

1985			1986
\$		\$	\$
	Capital and retained earnings		
69,022	Balance as at 1 January 1986	95,822	
26,800	Donations received (Note 2)	<u>16,200</u>	112,022
	Retained earnings		
<u>27,077</u>	Accumulated funds		<u>36,619</u>
<u>122,899</u>		<u>148,641</u>	
	Represented by—		
107,000	Investments (Note 3)		132,700
	Current assets—		
226	Medal stocks (at cost)	195	
3,331	Accrued interest	4,731	
	Cash at bank—		
724	Commonwealth Savings Bank	1,207	
11,305	Advance Bank investment account	9,598	
313	Advance Bank passbook account	<u>210</u>	<u>15,941</u>
<u>122,899</u>			<u>148,641</u>

P. Anquetil
 Hon. Secretary
 Farrer Memorial Trust
 9 April 1987

Income and expenditure account as at 31 December 1986

1985		1986
\$		\$
	Income	
12,045	Interest from investments	16,166
956	Interest from cash at bank	813
-	Donations (Note 2a)	1,625
<u>13,001</u>		<u>18,604</u>
	Expenditure	
6,093	Cost of Scholarship	8,581
1,322	Oration expenses	452
15	Bank charges	30
1,161	Advertising and publicity	-
8,591		9,063
<u>4,410</u>	Excess of income over expenditure	<u>9,541</u>
<u>13,001</u>		<u>18,604</u>

Statement of sources and application of funds as at 31 December 1986

1985		1986	
\$		\$	\$
	Source of funds		
	Funds flow from operations—		
13,001	Operating funds inflows	18,604	
8,591	Less operating funds outflows	<u>9,063</u>	9,541
<u>26,800</u>	Donations received and added to Capital Account		<u>16,200</u>
<u>31,210</u>			<u>25,741</u>
	Application of funds		
(4,090)	Increase (decrease) in working capital (Note A).		41
<u>35,300</u>	Increase in investments		<u>25,700</u>
<u>31,210</u>			<u>25,741</u>
Note A	Changes in working capital		
	Sources of funds—		
(33)	Decrease in medal stocks		(32)
754	Increase (decrease) in accrued interest		1,400
<u>721</u>			<u>1,368</u>
	Applications of funds—		
(4,811)	Increase (decrease) in cash at bank		(1,327)
<u>(4,090)</u>	Net increase (decrease) in working capital		<u>41</u>

Investments as at 31 December 1986

Investment	Interest Rate	Maturity Date	Amount \$	
Australian Resources Development Bank				
Transferable Deposit	12.25%	31.3.89	7,200	
IBD	12.5%	30.11.87	5,000	12,200
Commonwealth Development Bank of Australia Ltd				
CDB Investment	13.5%	9.4.87	15,000	
CDB Investment	13.5%	7.7.89	16,000	31,000
Primary Industry Bank of Australia				
IBD	13.0%	31.3.89		8,000
State Bank of NSW				
Loan no. 10	5.375%	31.10.93		2,000
State Electricity Commission				
Loan no. 1360	14.0%	1.3.87		3,000
NSW Treasury Corporation				
Premier State Bonds	14.3%	1.10.88	33,000	
Premier State Bonds	14.3%	1.10.88	5,000	
Premier State Bonds	13.25%	1.3.88	2,500	
Premier State Bonds	11.75%	1.3.87	3,000	
Premier State Bonds	15.6%	1.7.93	3,000	
Premier State Bonds	14.5%	1.3.87	15,000	
Premier State Bonds	13.5%	1.3.90	15,000	76,500
				<u>\$132,700</u>

Notes to and forming part of the accounts for the year ending 31 December 1986

1. Summary of accounting policies:

- The accompanying financial statements have been prepared on an accrual basis in accordance with historical cost principles, having regard to current Australian accounting standards.
- The financial statements have been prepared in accordance with the requirements of Section 41B (1) of the Public Finance and Audit Act 1983.
- Policies adopted are consistent with those applied in the previous year.
- All administration costs (including salary and wages) are met directly from the Consolidated Fund allocation to the Minister for Agriculture, Lands and Forests. Such costs are estimated to be \$1,850 for the year.
- Except that no provision is made for the value of accrued long service and annual leave, no material amounts were owed to or by the fund as at 31 December 1986. Long service leave and annual leave are paid out of Consolidated Fund Appropriations when such leave is taken. There is no superannuation liability as at 31 December 1986.

2. Donations received and added to the Capital Account were:

	\$
Wheat Industry Research Committee of NSW	4,000
Wheat Industry Research Committee of Queensland	2,000
South Australian Government	1,000
Wheat Marketing (Barring of Claims) Fund—Transfer of proceeds prior to closure of fund	9,200
	<u>16,200</u>

- a. An amount of \$1,625.20 was donated by the NSW Flour Millers' Council and paid direct to the Scholarship holder, Mr B. Summerell, to meet part of his scholarship allowance.
- b. In keeping with a directive of the Treasurer, the Wheat Marketing (Barring of Claims) Fund was closed. The Treasurer gave approval, prior to the closure of the fund, to the transfer of \$30,000 to the Farrer Memorial Research Scholarship Fund. Investments totalling \$20,800 were subsequently transferred in 1985 whilst a further \$9,200 was transferred into the Farrer Memorial Research Scholarship Fund on 14 January 1986.
- c. The conditions relating to the donation from the Wheat Industry Research Committee are such that the donation must be expended in the areas of salaries, operating expenses or capital. As there are no salaries paid by the Trust and operating expenses are met from interest received on the investment of capital, the donation is credited to the Capital Account.
- d. Investments in public authorities and term deposits are valued at cost and market value and are held to maturity. All investments are quoted on the Sydney Stock Exchange.

1985		1986	
Cost Value \$	Market Value \$	Cost Value \$	Market Value \$
12,200.00	12,200.00	Australian Resources Development Bank	12,200.00 12,200.00
25,000.00	25,000.00	Commonwealth Development Bank of Australia	31,000.00 31,000.00
13,500.00	13,108.85	NSW Treasury Corporation	76,500.00 76,175.31
3,700.00	3,605.17	Metropolitan Water Sewerage & Drainage Board	- —
19,800.00	18,918.00	State Bank of NSW	2,000.00 1,229.16
8,800.00	8,000.00	Primary Industry Bank of Australia	8,000.00 8,000.00
3,000.00	3,077.10	State Electricity Commission	3,000.00 3,132.18
21,800.00	21,800.00	Advance Bank of Australia	
<u>107,000.00</u>	<u>105,709.12</u>	<u>132,700.00</u>	<u>131,736.65</u>



Statement by Director-General

Pursuant to Clause 8 of the Public Finance and Audit (Departments) Regulation 1986, I state that:

- a. The accompanying financial statements have been prepared in accordance with the provisions of the Public Finance and Audit Act 1983, the Public Finance and Audit (Departments) Regulation 1986, and the Treasurer's Directions.
- b. The statements present fairly the receipts and payments of that part of the Consolidated Fund, and those accounts in the Special Deposits Account, operated by the Department.
- c. There are not any circumstances which would render any particulars included in the financial statements to be misleading or inaccurate.

G. H. Knowles
Director-General

Auditor-General's Certificate

The accounts of the Department of Agriculture for the year ended 30 June 1987, have been audited in accordance with Section 34 of the Public Finance and Audit Act 1983.

In my opinion, the accompanying receipts and payments statement, summarised receipts and payments statement and statement of special deposits account balances, read in conjunction with the notes thereto, comply with Section 45E of the Act and are in accordance with the accounts and records of the Department.

K. J. Robson FASA CPA
Auditor-General of New South Wales
Sydney
11 January 1988

Notes to Financial Statements

Note 1. Accounting methods and policies

- a. The financial statements have, for the first time, been prepared on a program budgeting basis. The Department's receipts and payments figures are now disclosed under seventeen programs as compared with the six appropriation votes in 1985-86. A new classification of accounts and a computerised ledger were implemented in 1986-87 to facilitate program accounting. Consequently previous-year figures could not be provided for each of the programs disclosed in Table A.
- b. The financial statements of the Department have been prepared on the basis that the transactions of the public accounts are reported on a cash basis, with the exception of payments for salaries which are reported on an accrual basis.
- c. The financial details provided in Tables A and B relate to transactions on Consolidated Fund and Special Deposits Accounts.
- d. The financial data provided in Table A 1 represent all receipts and expenditure details for each of the programs for which funds were appropriated from the Consolidated Fund.

Table A 2 represents all receipts and expenditure details for each of the programs in respect of Special Deposits Accounts. In some instances where financial details could not be dissected into programs, transactions have been included in the non-program column of Table A.

- e. A reference in the receipts and payments statements to an 'estimate' figure means:
 - i. in the case of a special appropriation the amount included in the estimates in respect of that appropriation; and
 - ii. in the case of an annual appropriation the amount appropriated in the relevant Appropriation Act as advised by the Treasury.
- f. A reference in the receipts and payments statement to an 'actual' figure means the payments actually made by the Department in respect of the item to which it refers—with the exception of the payment for salaries which is reported on an accrual basis as per (c) above.
- g. Estimates for Special Deposits Account receipts and payments are not prepared by the Department and not shown within the financial statements.

- h. Special Deposits Account expenditure has for the first time been recorded on a line item basis and is included with Consolidated Fund recurrent payments expenditure items in Table B.

Note 2. Changes in accounting policy

a. *Transfer of Consolidated Fund grants to Special Deposits Accounts*

In 1985–86, the budget appropriation for Consolidated Fund grants was included under the Consolidated Fund recurrent payments heading of 'other services'. An amount of \$7.9 million for these grants was transferred from the Consolidated Fund to the Special Deposits Accounts, and was disclosed in the financial statements of the Department as a payment from 'Consolidated Fund—other services' item, and a receipt in the Special Deposits Accounts under the heading 'Consolidated Fund grants'.

In 1986–87, with the advent of program budgeting, items previously included within the other services area, which constituted payments in the nature of salaries and other employee payments, and maintenance and working expenses, have now been reflected under these headings. Including Commonwealth grants (referred to in Note 2 b), the financial statements disclosed an amount of \$11.8 million that was transferred from Consolidated Fund to the Special Deposits Accounts under these recurrent payment headings.

The corresponding receipt in the Special Deposits Accounts is not displayed and total departmental payments are finally reduced by these transfers. This treatment of the inter-fund transfers ensures that net program receipts and net program payments are disclosed.

b. *Commonwealth grants previously disclosed in Special Deposits Account receipts, and now transferred from Consolidated Fund to Special Deposits Accounts*

In 1985–86 certain Commonwealth grants, amounting to \$5.2 million, were received by the Department and credited directly to the appropriate Special Deposits Account. From the commencement of the 1986–87 financial year, the Treasury altered the accounting treatment for these receipts, whereby Commonwealth grants were forwarded directly to the Treasury of NSW, and the Department's Consolidated Fund recurrent payments allocation increased to reflect the equivalent Commonwealth grants. Including Consolidated Fund grants referred to in Note 2 a, the financial statements disclosed an amount of \$11.8 million that was transferred from the Consolidated Fund recurrent payments headings to the Special Deposits Accounts. Receipt into the Special Deposits Accounts is not displayed and total departmental payments are finally reduced by these transfers. This treatment of the inter-fund transfers ensures that net program receipts and net program payments are disclosed.

c. *Commonwealth Grants previously included in Consolidated Fund as payments under 'other services' heading*

In 1985–86, a number of Commonwealth grants administered through the Consolidated Fund were included in that year's budget allocation and financial statements of the Department under the 'Consolidated Fund—other services' heading.

In 1986–87, grants previously included within the 'other services' area, and which constituted payments in the nature of salaries and other employee payments, and maintenance and working expenses, have now been reflected under these headings.

Note 3. Amounts due and unpaid for goods and services received

	1986–87	1985–86
Total value	\$1,408,191	\$904,475

The amount shown is an estimate calculated on the basis of actual unpaid vouchers on hand as at 30 June 1987.

Note 4. Outstanding commitments as at 30 June 1987

	1986–87 \$'000	1985–86 \$'000
Capital works and services (contractual commitments)*	8,511	4,069
Goods and services	816	1,232
Lease/hire	NIL	NIL
Total	\$9,327	\$5,301
* Brackish Water Fish Culture Research Station, Salamander Bay	748	
John Macarthur Agricultural Institute, Camden Park	5,823	
Temora/Deniliquin Outreach Centres	8	
Establishment of Deniliquin Field Station	150	
C. B. Alexander Agricultural College extensions	1,257	
Biological and Chemical Research Institute— fire hazard prevention	525	
	\$8,511	

Note 5. Schedule of repayable amounts owing on public borrowings and other repayable advances

a. *1968–69 advance of \$50,600*

Loan period of 30 years
\$1,686.67 repayable per annum. Purpose of advance: to provide for the increased cost of construction of tourist facilities within fisheries complexes. Balance owing on capital debt at 30.6.87—\$20,239.94 (balance 30.6.86—\$21,926.61).

- b. 1971–72 advance of \$120,000
 Loan period of 30 years
 \$4,000.00 repayable per annum. Purpose of advance: to assist in establishing a Research and Experimental Station at Narrandera.
 Balance owing on capital debt at 30.6.87—\$60,000.00 (balance 30.6.86—\$64,000.00).
 Interest paid on above loans: \$9,750.00 in 1986–87 (\$10,260.00 in 198–56).

Note 6. Schedule of debts written off—year ended 30 June 1987

The following is a list of debts written off during the year ended 30 June 1987.

Description	1986–87 \$	1985–86 \$
Oyster lease rental	174	—
Apiaries Act—licence renewal	47	—
Artificial stock breeding fees	693	2,669
Seed testing	13	—
Overpayment of salary	951	207
Prickly Pear Destruction Commission	435	311
Removal of diseased fruit trees	665	—
Hire of cattle yards	22	—
Seed testing fees	—	40
Emergency tail tags	—	50
Laboratory testing charges	—	5
Total	\$3,000	\$3,282

Note 7. Contingent amount payable to the Department

Meat inspection fees—\$3,717,006.83. Such fees have been outstanding for many years.

Through the State Crown Solicitor's Office, the Department has initiated legal action against one firm as a test case to prove the legality of the fees. The case has not yet come before the court.

So as not to jeopardise the Department's legal rights in relation to other debtors, under Section 14 of the Limitation Act 1969, the Department has referred all debtors to the State Crown Solicitor's Office for initiation of legal action.

Notwithstanding action taken by the Department during the year to prevent the debts becoming Statute barred, debts to the value of \$371,269 have become Statute barred and are now deemed irrecoverable.

Note 8. Salaries and wages expenditure

Salaries and wages expenditure shown for both 1985–86 and 1986–87, and funded from the Consolidated Fund, includes the full year's costs. The amount of \$1,592,181.43 was transferred to Special Deposits Account No. 1140 representing 5/14ths of the salary costs for the pay period commencing 26 June 1987.

Note 9. Capital works and services

Details of expenditure on capital works and services are listed in Table B.

Note 10. Schedule of uncollected amounts as at 30 June 1987

Schedule A details all uncollected amounts as at 30 June 1987. Appropriate action is currently being undertaken to ensure full recovery of all debts.

Note 11. Other services

It is estimated that the cost of other services provided by the Department, but not met from its budget allocation, totalled \$7,859,000 in 1986–87. Details of such are as follows:

	1986–87 \$'000	1985–86 \$'000
Rent (based on rental accommodation as supplied by P.S.B. Office Accommodation Bureau)	948	2,778
Payroll Tax (based on calculation of 6% of the total assessable expenditure of \$78,595,952)	4,715	4,278
Government cleaning service (based on estimate from Government Supply Department)	1,803	1,930
Repairs, maintenance and renewals, public buildings fitout etc. (based on figures determined by Department of Public Works)	393	376
Total	\$7,859	\$9,362

In addition, the Crown Solicitor's Office has assisted on legal matters; and the Government Printing Office branches located in various Government office buildings provide printing and copying facilities. The cost of these services has not been assessed.

Note 12. Revenue—Consolidated Fund

Revenue banked by the Department into the Consolidated Fund totalled \$13,207,000 (\$13,859,000 in 1985–86). This was dissected as follows:

	\$
a. Receipts for services rendered	643,000
Rental of departmental cottages, and student fees for departmental agricultural colleges	
b. Fees—general	1,611,000
Fees received for registration and licence renewals for the various Statutes administered by the Department.	
c. Commonwealth contributions	6,158,000
These represent contributions by the Commonwealth government for work carried out by this Department on behalf of the Commonwealth, under the provisions of Commonwealth legislation:	
	\$
Plant quarantine services	3,138,000
Commerce (Trade Descriptions) Act	1,234,000
Overtime—Export and Import Branch	77,000

CSIRO cotton research	62,000	
Animal quarantine services	1,038,000	
Commonwealth fisheries	402,000	
Animal export services	207,000	
d. Fees—miscellaneous services rendered	1,815,000	
Monies received for departmental services rendered		
e. Miscellaneous receipts	2,636,000	
f. Administration charges	344,000	

13. Audit Fees

The fee for auditing the Department of Agriculture for the year ended 30 June was \$79,500 (\$75,000—1985–86). The Auditor received no other benefits.

Note 14. Special Deposit Account balances held and inactive for more than 2 years

Account description	Amount (\$)	Particulars
Donation from Poll Hereford Society—neuraxial oedema	144.24	Relevant action to be initiated to clear account
McGarvie Smith Institute—grant for capital equipment	13.90	"
Contribution by Kippers Aust. P/L: mushroom research—casings	538.00	"
Donation by IREC: salary expenses	1,024.67	"
Grant: poultry industry golf day	405.00	"
Donation: Australian Cotton Growers—pest management project	782.85	"
Weeds—working account	468.67	"
Electricity Commission of NSW survey power site—Tuggerah	978.59	"
Electricity Commission of NSW survey power site—Mt Piper	1,517.80	"
Electricity Commission of NSW survey power site—Olney	1,807.03	"
Electricity Commission of NSW survey power site—Apsley	1,908.93	"
Electricity Commission of NSW survey power site—Foybrook	1,378.47	"
Short course—May 1979: agriculture remote sensing	778.75	"
Course 2—advisory appraisal group	95.00	"
Course 16—bankers seminar on primary industry May/April 1984	288.73	"
Oyster lease stamp duty suspense—Gunnedah region	1,469.84	"
C.S.R.G 1982–83 fababeen research and development	140.00	"

Organisation of national apicultural conference	2,158.02	"
Argentine ant research project	23.28	"
Oyster lease stamp duty suspense—head office	(626.60)	"
Studies in energy consumption in tillage operations	495.09	"
Wool Research Trust Fund—postgraduate scholarship	2,443.00	"
Course 3—bee school	43.32	"
Course 8—pesticide training course	119.30	"
Course 17—soil school, March 1984 (Gunnedah)	93.50	"
Course 24—small farms course	661.66	"
Course 25—livestock appraisal for agents (Mudgee)	389.50	"
Course 26—Livestock appraisal for agents (Gunnedah)	(262.06)	"
Course 29—metro-noxious and community plant control	(43.18)	"
Course 31—noxious plant seminar	(38.00)	"
Course 33—pest control in lucerne for seed	(9.00)	"
Course 36—livestock appraisal course	168.35	"
Course 37—livestock appraisal course	(107.33)	"
Course 38—farming seminar course	(429.90)	"
Course 40—beef cattle school	(1.00)	"
Course 41—lamb appraisal	(33.57)	"
Course 37—soil conservation	(37.02)	"
Course 43—farm enterprise tour for bank managers	(57.04)	"
Contribution—Leeton and Mirrool Association towards red scale research	229.50	"

Note 15. Supplementation of funds and transfer of funds

Schedule B details all supplementation of funds, and transfers of funds between programs, approved by the Treasury during the financial year.

Note 16. Significant variation between appropriation and estimates, and actual results

Schedule C details significant variation detected between appropriation and estimates, and actual results.

Note 17. Significant variations between current and previous-year receipts and payments actuals

Schedule D details significant variations between current and previous-year receipts and payments actuals.

Schedule A—Schedule of uncollected amounts as at 30.6.8

Classification	Current \$	30–60 days \$	60–90 days \$	90 days and over \$	Total \$
Laboratory testing charges	27,374	14,392	5,410	3,011	50,187
Seed certification fees	30,104	18,518	98	1,159	49,879
Sale of publications	45	481	1,543	7,361	9,430
Graham Park breeding services	39,170	—	10,357	23,227	72,754
Recovery of employers liability for superannuation	—	—	—	4,719	4,719
Repayment of employers liability Under P.S.B. Bond	—	—	—	22,418	22,418
Recovery of salary overpayments	—	—	—	2,708	2,708
Recoupment of salary costs for officers on loan	153	—	—	10,110	10,263
Recovery of costs—					
Commonwealth—State trade promotion program	—	7,407	—	—	7,407
Fleece measurement service	2,975	457	143	1,495	5,070
Board of Tick Control— overtime charges	2,045	—	584	822	3,451
Board of Tick Control— dipping Fees	7,560	398	—	—	7,958
Sale of farm produce	5,455	17,285	—	13,749	36,489
Recoupment of private telephone charges on departmental cottages	3,223	1,648	—	3,358	8,229
Recoupment of costs under Section 18A Plant Diseases Act	12,697	11,454	3,823	6,429	34,403
Sheep meat testing	—	468	80	633	1,181
Student board and lodging fees	—	—	7,505	5,618	13,123
Short course fees	180	1,125	157	—	1,462
Recoupment of expenses—charter of aircraft	1,500	398	—	4,398	6,296
Miscellaneous services	3,064	271	314	14,742	18,391
Herd recording fees	142	1,010	—	315	1,467
Sale of emergency tail tags	862	—	—	136	998
Total	136,549	75,312	34,412	122,010	368,28

Schedule B—Supplementation and Transfer
of Funds Approved by the Treasury

Horticulture program	\$		Grants and subsidies:	
Salary and payments in the nature of salary:			D021 Wild dog destruction	14,000
A100 Salaries, wages and allowances	265,281		E Relocate travel stock route	(51,000)
A200 Payments for leave on retirement, resignation etc.	266,690			
Maintenance and working expenses:				\$69,641
B101 workers compensation insurance	33,109		Intensive animal industries program	
B Total maintenance and working expenses	(3,421)		Salary and payments in the nature of salary:	
Other services:			A100 Salaries, wages and allowances	29,968
E071 eradication of potato cyst nematode	\$11,000		Maintenance and working expenses:	
E Discased strawberry plants	374,500		B101 Workers compensation insurance	5,036
E Commodity treatment of fresh fruit	(13,000)		B Total maintenance and working expenses	15,409
	\$934,159		Other services:	
			E083 Beekeepers compensation	4,000
				\$54,413
Field crops and pastures program			Animal health services program	
Salary and payment in the nature of salary:			Salary and payments in the nature of salary:	
A100 salaries, wages and allowances	122,000		A100 Salaries, wages and allowances	(902,572)
A200 Payments for leave on retirement, resignation etc.	149,932		A200 Payments for leave on retirement, resignation etc.	570,000
Maintenance and working expenses:			Maintenance and working expenses:	
B101 Workers compensation insurance	65,758		B101 Workers compensation insurance	96,597
B Total maintenance and working expenses	80,961		B Total maintenance and working expenses	166,000
Plant and equipment:			Other services:	
C003 Other major plant and equipment	246,000		E086 Feral animal exotic disease control study	28,000
	\$664,651		Plant and equipment:	
			C003 Other major plant and equipment	(2,000)
				\$ (43,975)
Plant quarantine and export services program			Marine fisheries—regulation and management program	
Salary and payments in the nature of salary:			Salary and payments in the nature of salary:	
A100 Salaries, wages and allowances	(112,000)		A100 Salaries, wages and allowances	84,653
Maintenance and working expenses:			A200 Payment for leave on retirement, resignation, etc.	6,287
B101 Workers compensation insurance	18,113		A300 Overtime	519
B Total maintenance and working expenses	112,000		Maintenance and working expenses:	
	\$18,113		B101 Workers compensation insurance	(2,850)
			B Total maintenance and working expenses	(39,556)
Extensive animal industries program			Other services:	
Salary and payments in the nature of salary:			E094 Meshing of sharks	20,000
A100 Salaries, wages and allowances	(76,049)			\$69,053
A200 Payments for leave on retirement, resignation, etc.	176,799			
Maintenance and working expenses:				
B101 Workers compensation insurance	9,891			
B Total maintenance and working expenses	(4,000)			

Marine fisheries—research and development program	
Salary and payments in the nature of salary:	
A100 Salaries, wages and allowances	(40,000)
A200 Payment for leave on retirement, resignation etc.	75,000
Maintenance and working expenses:	
B101 Workers compensation insurance	(13,253)
B Total maintenance and working expenses	40,000
Plant and equipment:	
C003 Other major plant and equipment	(102,000)
	\$(40,253)

Inland fisheries—regulation and management program	
Maintenance and working expenses:	
B101 Workers compensation insurance	(3,710)
B Total maintenance and working expenses	80,000
Plant and equipment:	
C003 Other major plant and equipment	1,890
Other services:	
E NSW Recreational Fishing Advisory Council	(2,730)
	\$75,450

Inland fisheries—research and development program	
Salary and payments in the nature of salary:	
A200 Payment for leave on retirement, resignation etc.	10,000
Maintenance and working expenses:	
B101 Workers compensation insurance	(5,551)
B Total maintenance and working expenses	112,000
Plant and equipment:	
C003 Other major plant and equipment	840
	\$117,289

Technical services program	
Salary and payments in the nature of salary:	
A100 Salaries, wages and allowances	291,709
A200 Payment for leave on retirement, resignation etc.	110,000
A300 Overtime	502
Maintenance and working expenses:	
B101 Workers compensation insurance	39,616
B Total maintenance and working expenses	80,485
	\$522,312

Education program	
Salary and payments in the nature of salary:	
A100 Salaries, wages and allowances	103,695
Maintenance and working expenses:	
B101 Workers compensation insurance	11,499
Other Services:	
E103 Support of agricultural courses at departmental colleges	37,000
	\$152,194

Agricultural services grants program	
Salary and payments in the nature of salary:	
A100 Salaries, wages and allowances	(540)
Maintenance and working expenses:	
A101 Workers compensation insurance	580
B Total maintenance and working expenses	540
Grants and subsidies:	
D027 Commonwealth agricultural bureaux	26,000
D030 Pastures protection boards	11,000
D189 Rural councillors—contribution	15,101
	\$52,681

Marketing services program	
Salary and payments in the nature of salary:	
A100 Salaries, wages and allowances	(44,812)
A200 Payments for leave on retirement, resignation etc.	35,000
Maintenance and working expenses	
B101 Workers compensation insurance	4,409
B Total maintenance and working expenses	121
	\$(5,282)

Economic services program	
Salary and payment in the nature of salary:	
A100 Salaries, wages and allowances	(97,687)
A200 Payment for leave on retirement, resignation etc.	40,000
Maintenance and working expenses:	
B101 Workers compensation insurance	4,295
B Total maintenance and working expenses	(8,773)
	\$(62,165)

Overseas projects program	
Salary and payments in the nature of salary:	
A100 Salaries, wages and allowances	54,585
Maintenance and working expenses:	
B101 Workers compensation insurance	25
B Total maintenance and working expenses	(19,985)
	\$34,625

Administrative support services program	
Salary and payments in the nature of salary:	
A100 Salaries, wages and allowances	305,360
A200 Payments for leave on retirement, resignation etc.	173,331
A300 Overtime	6,942
Maintenance and working expenses:	
B101 Workers compensation insurance	4,358
B Total maintenance and working expenses	(77,612)
Other Services:	
E001 Overseas visits	19,656
	\$432,035

Schedule C—Significant variation between appropriation and estimates, and actual results

(This schedule does not form part of the accounts subject to audit)

- Horticulture program**
 - Payments—salaries and other employee payments.* Estimate—\$9,432,000, actual—\$9,660,000. Variation due to unexpected increase in the retirement and resignation of a number of officers. Supplementation to the value of \$266,690 approved.
 - Payments—other services.* Estimate—\$239,000, actual—\$607,000. Increase in expenditure due to payment of compensation, amounting to \$374,500, resulting from the supply of virus-infected strawberry plants to growers.
- Field crops and pastures program**
Payments—salaries and other employee payments, maintenance and working expenses, and plant and equipment. Increase in expenditure due to costs associated with Australian Water Research Advisory Council project dealing with groundwater control, and Federal water resources assistance program concerned with salinity control being transferred to the Department. Including these projects, supplementation to the value of \$664,651 was approved for this program.
- Plant quarantine and export services program**
Payments—Salaries and other employee payments. Estimate—\$3,363,000, actual—\$3,205,000.
Maintenance and working expenses. Estimate—\$1,443,000, actual— \$1,584,000. Variance due mainly to transfer of \$112,000 from salaries and other employee payments, to maintenance and working expenses. The transfer was approved by the Treasurer to provide for increased costs associated with maintenance and working expenses.
- Animal health industries program**
 - Payments—salaries and other employee payments.* Estimate— \$18,397,000, actual—\$18,043,000.
Maintenance and working expenses. Estimate—\$7,077,000, actual— \$7,175,000. Variance mainly due to transfer of \$166,000 from salaries and

other employee payments, to maintenance and working expenses. The transfer was approved by the Treasurer to provide for increased costs associated with maintenance and working expenses.

- b. *Payments—other services.* Estimate—\$157,000, actual—\$184,000. Increase due to contribution towards feral animal exotic disease control study. Supplementation to the value of \$28,000 approved.

5. Technical services program

Payments—maintenance and working expenses. Estimate—\$4,323,000, actual—\$4,423,000. Increase due to increase in workers compensation insurance premium, amounting to \$39,616, and to increase in costs associated with providing services. Supplementation to the total value of \$522,312 was approved for this program.

6. Agricultural services grant program

Payments—grants and subsidies. Estimate—\$162,000, actual \$206,000. Increase due to additional contributions towards Commonwealth Agricultural Bureaux, Pastures Protection Boards, and Rural Counsellors—contributions. Including these projects, supplementation to the total value of \$52,681 was approved for this program.

7. Overseas projects program

Payments—salaries and other employee payments. Estimate—\$53,000, actual \$103,000. Increase due to additional expenditure within program following change to program budget format. Supplementation, via transfer of funds within Department's overall budget, amounting to \$54,585 was approved.

8. Administrative support program

Payments—salaries and other employee payments. Estimate—\$4,931,000, actual—\$5,351,000. Variation due to unexpected increase in the retirement and resignation of a number of officers, and additional expenditure within program following change to program budget format. Supplementation via transfer of funds within Department's overall budget, amounting to \$394,633, and additional supplementation from the Treasury amounting to \$91,000, approved.

Schedule D—Summary of significant variation between current and previous-year receipts and payments actuals

a. Consolidated Fund recurrent receipts

- i. *Livestock marketing reporting service.* 1985–86 actual \$128,000, 1986–87 actual \$66,000. Variation due to reduction in use of service.
- ii. *Fees—general.* 1985–86 actual \$932,000, 1986–87 actual \$841,000. Variation due to general economic downturn within agricultural industry, hence chargeable services provided by the Department are not utilised.
- iii. *Fees—miscellaneous services.* 1985–86 actual \$1,916,000, 1986–87 actual \$1,686,000. Variation due mainly to reduction in revenue for artificial stock breeding service by \$117,000 and cattle laboratory testing by \$22,000.

- iv. *Commonwealth contributions: Commerce (Trade Descriptions) Act, and overtime—export and import services.* 1985–86 actual \$1,514,000, 1986–87 actual \$1,311,000. Variation due to 1985–86 unexpended receipts, amounting to \$220,000 and retained by the Department, being reduced from the 1986–87 Commonwealth contribution towards this service.

- v. *Sales of farm produce.* 1985–86 actual \$1,143,000, 1986–87 actual \$1,067,000. Variation due to general downturn in market prices, and drought conditions within the State which affected crop yields.

- vi. *Fisheries and Oyster Farms Act.* 1985–86 actual \$677,000, 1986–87 actual \$770,000. Variation due mainly to: a. increase in professional fisherman's licence receipts by \$70,000; b. increase in oyster lease rentals receipts by \$15,000.

- vii. *Witness and jurors fees.* 1985–86 actual \$4,000, 1986–87 actual \$70,000. Variation due to increased number of officers required to provide professional advice in agricultural/veterinary matters at court.

- viii. *On-costs for officers on loan.* 1985–86 actual \$252,000, 1986–87 actual \$108,000. 1985–86 receipts for this item were exceptionally high due to number of officers on secondment. 1986/87 receipts reflect normal receipts for this item.

b. Consolidated Fund recurrent payments

Salaries and other employee payments. 1985–86 actual \$67.8 million, 1986–87 actual \$83.3 million.

Maintenance and working expenses. 1985–86 actual \$23.5 million, 1986–87 actual \$32.0 million.

Plant and equipment. 1985–86 actual \$353,000, 1986–87 actual \$1.4 million.

Other services. 1985–86 actual \$16.4 million, 1986–87 actual \$1.6 million. Variations due to change in accounting policy as referred to in Note 2 of the financial statements.

c. Special Deposits Accounts receipts

- i. *Consolidated Fund grants.* 1985–86 actual \$7.9 million, 1986–87 actual \$nil.

Commonwealth grants. 1985–86 actual \$5.2 million, 1986–87 actual \$nil.

Special Statutes appropriation. 1985–86 actual \$60,000, 1986–87 actual \$nil.

Variation due to change in accounting policy as referred to in Note 2 of the financial statements.

- ii. *Industry funds grants.* 1985–86 actual \$4.4 million, 1986–87 actual \$5.4 million. Variation due to increased support from industry for research and development.
- iii. *Employment scheme grants.* 1985–86 Actual \$9.6 million, 1986–87 actual \$3.7 million. Variation due to lower amounts received in 1986–87 for Commonwealth employment schemes.

- iv. *Working accounts.* 1985–86 actual \$4.0 million, 1986–87 actual \$4.9 million. Variation due mainly to: a. increase in the number of working accounts maintained by the Department; b. increase in activities of existing working accounts.

- v. *Commonwealth subsidy—Egg Marketing Board.* Due to Legislative requirements, the subsidy from the Commonwealth to the Egg Marketing Board is directed to the Department. The Department receipts the subsidy and in due course makes payments to the Egg Marketing Board. This arrangement has been in operation for a number of years, and the amount of subsidy to the Egg Marketing Board is not subject to this Department's review.
- vi. *Interest on Investments:* 1985–86 actual \$417,000, 1986–87 actual \$nil. Variation due to non-receipt of interest on investment of the cattle compensation fund: 1986–87 interest received during 1987–88.
- d. **Special Deposits Accounts payments**
- i. *Salaries and other employee payments.* 1985–86 actual \$23.5 million, 1986–87 actual \$16.9 million. Variation due mainly to lower amounts received for Commonwealth employment schemes by \$5.9 million.
- ii. *Maintenance and working expenses.* 1985–86 actual \$10.8 million, 1986–87 actual \$14.1 million. Variation due mainly to increase in industry fund grants, and variation due to changes in accounting policy as referred to in Note 2 of the financial statements.
- iii. *Grants and subsidies.* 1985–86 actual \$1.1 million, 1986–87 actual \$nil. *Other services.* 1985–86 actual \$421,000, 1986–87 actual \$17,000. Variations due to change in accounting policy as referred to in Note 2 of the financial statements.

Table A 1.1 Receipts and Payments Statement for the year ended 30 June 1987

Details	Note	Horticulture Program			Field Crops and Pastures Program			Plant Quarantine and Export Services Program		
		1985/86	1986/87		1985/86	1986/87		1985/86	1986/87	
		Actual	Estimate	Actual	Actual	Estimate	Actual	Actual	Estimate	Actual
Consolidated Fund		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Receipts										
Reimbursement of Costs:										
Livestock Marketing Reporting Service										
Fees—General				29						
Fees—Miscellaneous Services				2			411			
Dipping Fees										
Reimbursement—Administrative Costs										116
Commonwealth Contributions:										
Plant Quarantine Service										3,138
Commerce (Trade Descriptions) Act										1,234
Overtime—Export & Import Services										77
Animal Quarantine Services										
Animal Export Services										
Fisheries										
CSIRO Cotton Research							62			
Receipts for Services Rendered:										
Rents										
Students Fees							2			
Sale of Government Property										
Sales of Farm Produce				246			159			
Sales of Publications										
Fines and Forfeitures										
Fisheries & Oyster Farms Act										
Witness and Jurors Fees										
Collection of Premiums										
Interest										
Repayments to Credit of Vote, Previous Year										
Employer's Superannuation Contribution				2			55			264
Apprenticeship Training Scheme										
Unclassified Receipts							3			
On-Costs for Officers on Loan										
Miscellaneous Receipts for Services Rendered				25						81
Total Consolidated Fund Receipts		0	402	304	0	413	692	0	5,339	4,910
Payments										
Salaries and other employee payments	16		9,432	9,660		18,179	18,342		3,363	3,205
Maintenance and working expenses	16		2,514	2,579		5,244	5,324		1,443	1,584
Plant and equipment	16					79	227		54	10
Grants and subsidies						2,500	2,500			
Other services	16		239	607		48	47			
Capital Works and Services			809	805		1,042	1,476			
Total Consolidated Fund Payments		0	12,994	13,651	0	27,092	27,916	0	4,860	4,799

Table A 1.2 Receipts and Payments Statement for the year ended 30 June 1987

Details	Note	Extensive Animal Industries Program			Intensive Animal Industries Program			Animal Health Industries Program		
		1985/86	1986/87		1985/86	1986/87		1985/86	1986/87	
		Actual	Estimate	Actual	Actual	Estimate	Actual	Actual	Estimate	Actual
Consolidated Fund		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Receipts										
Reimbursement of Costs:										
Livestock Marketing Reporting Service										
Fees—General				30		322				355
Fees—Miscellaneous Services				1,196		6				20
Dipping Fees										59
Reimbursement—Administrative Costs						10				218
Commonwealth Contributions:										
Plant Quarantine Service										
Commerce (Trade Descriptions) Act										
Overtime—Export & Import Services										
Animal Quarantine Services										1,038
Animal Export Services										207
Fisheries										
CSIRO Cotton Research										
Receipts for Services Rendered:										
Rents										
Students Fees				1						
Sale of Government Property				35						14
Sales of Farm Produce				660			1			
Sales of Publications										
Fines and Forfeitures										
Fisheries & Oyster Farms Act										
Witness and Jurors Fees										
Collection of Premiums										
Interest										
Repayments to Credit of Vote, Previous Year										
Employer's Superannuation Contribution				88						120
Apprenticeship Training Scheme										
Unclassified Receipts				4						10
On-Costs for Officers on Loan										
Miscellaneous Receipts for Services Rendered				5						99
Total Consolidated Fund Receipts		0	2,610	2,019	0	542	339	0	2,177	2,140
Payments										
Salaries and other employee payments	16		9,019	9,045		1,737	1,712		18,397	18,043
Maintenance and working expenses	16		3,074	3,129		629	658		7,077	7,175
Plant and equipment			68	67					257	257
Grants and subsidies			45	58						
Other services	16		110	29		37	35		157	184
Capital Works and Services			176	172		0	9		1,087	910
Total Consolidated Fund Payments		0	12,492	12,500	0	2,403	2,414	0	26,975	26,569

Table A 1.3 Receipts and Payments Statement for the year ended 30 June 1987

Details	Note	Marine Fisheries—Regulation and Management Program			Marine Fisheries—Research and Development Program			Inland Fisheries—Regulation and Management Program		
		1985/86	1986/87		1985/86	1986/87		1985/86	1986/87	
		Actual	Estimate	Actual	Actual	Estimate	Actual	Actual	Estimate	Actual
Consolidated Fund		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Receipts										
Reimbursement of Costs:										
Livestock Marketing Reporting Service										
Fees—General										
Fees—Miscellaneous Services				22						
Dipping Fees										
Reimbursement—Administrative Costs										
Commonwealth Contributions:										
Plant Quarantine Service										
Commerce (Trade Descriptions) Act										
Overtime—Export & Import Services										
Animal Quarantine Services										
Animal Export Services										
Fisheries				402						
CSIRO Cotton Research										
Receipts for Services Rendered:										
Rents										
Students Fees										
Sale of Government Property				85						
Sales of Farm Produce										
Sales of Publications										
Fines and Forfeitures				21						
Fisheries & Oyster Farms Act				770						
Witness and Jurors Fees										
Collection of Premiums										
Interest										
Repayments to Credit of Vote, Previous Year										
Employer's Superannuation Contribution										82
Apprenticeship Training Scheme										
Unclassified Receipts				9						
On-Costs for Officers on Loan										
Miscellaneous Receipts for Services Rendered										
Total Consolidated Fund Receipts		0	1,083	1,309	0	0	0	0	0	82
Payments										
Salaries and other employee payments			2,214	2,296		2,155	2,173		346	365
Maintenance and working expenses			1,313	1,309		1,060	1,079		321	398
Plant and equipment			250	247		291	291		54	54
Grants and subsidies										
Other services			260	276		81	81		4	4
Capital Works and Services			170	245		935	373			
Total Consolidated Fund Payments		0	4,207	4,373	0	4,522	3,997	0	725	821

Table A 1.4 Receipts and Payments Statement for the year ended 30 June 1987

Details	Note	Inland Fisheries—Research and Development Program			Technical Services Program			Education Program		
		1985/86	1986/87		1985/86	1986/87		1985/86	1986/87	
		Actual	Estimate	Actual	Actual	Estimate	Actual	Actual	Estimate	Actual
Consolidated Fund		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Receipts										
Reimbursement of Costs:										
Livestock Marketing Reporting Service										
Fees—General							105			
Fees—Miscellaneous Services							29			
Dipping Fees										
Reimbursement—Administrative Costs										
Commonwealth Contributions:										
Plant Quarantine Service										
Commerce (Trade Descriptions) Act										
Overtime—Export & Import Services										
Animal Quarantine Services										
Animal Export Services										
Fisheries										
CSIRO Cotton Research										
Receipts for Services Rendered:										
Rents										178
Students Fees										455
Sale of Government Property										65
Sales of Farm Produce										1
Sales of Publications							117			
Fines and Forfeitures										
Fisheries & Oyster Farms Act										
Witness and Jurors Fees										
Collection of Premiums										
Interest										
Repayments to Credit of Vote, Previous Year							1			
Employer's Superannuation Contribution				66						
Apprenticeship Training Scheme										
Unclassified Receipts										1
On-Costs for Officers on Loan										
Miscellaneous Receipts for Services Rendered										
Total Consolidated Fund Receipts		0	0	66	0	209	252	0	607	700
Payments										
Salaries and other employee payments			911	918		7,536	7,314		2,628	2,675
Maintenance and working expenses	16		554	565		4,323	4,423		1,157	1,172
Plant and equipment			3	3					230	225
Grants and subsidies										
Other services									203	201
Capital Works and Services			174	144		553	683		419	231
Total Consolidated Fund Payments		0	1,642	1,630	0	12,412	12,420	0	4,637	4,504

Table A 1.5 Receipts and Payments Statement for the year ended 30 June 1987

Details	Note	Agricultural Services Grant Program			Marketing Services Program			Economic Services Program		
		1985/86	1986/87		1985/86	1986/87		1985/86	1986/87	
		Actual	Estimate	Actual	Actual	Estimate	Actual	Actual	Estimate	Actual
Consolidated Fund		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Receipts										
Reimbursement of Costs:										
Livestock Marketing Reporting Service							66			
Fees—General										
Fees—Miscellaneous Services										
Dipping Fees										
Reimbursement—Administrative Costs										
Commonwealth Contributions:										
Plant Quarantine Service										
Commerce (Trade Descriptions) Act										
Overtime—Export & Import Services										
Animal Quarantine Services										
Animal Export Services										
Fisheries										
CSIRO Cotton Research										
Receipts for Services Rendered:										
Rents										
Students Fees										
Sale of Government Property										
Sales of Farm Produce										
Sales of Publications										
Fines and Forfeitures										
Fisheries & Oyster Farms Act										
Witness and Jurors Fees										
Collection of Premiums										
Interest										
Repayments to Credit of Vote, Previous Year										
Employer's Superannuation Contribution										
Apprenticeship Training Scheme										
Unclassified Receipts										
On-Costs for Officers on Loan										
Miscellaneous Receipts for Services Rendered										
Total Consolidated Fund Receipts		0	0	0	0	156	66	0	0	0
Payments										
Salaries and other employee payments			79	73		977	949		1,154	1,072
Maintenance and working expenses			33	34		298	303		243	239
Plant and equipment										
Grants and subsidies	16		162	206						
Other services			55	50						
Capital Works and Services									0	13
Total Consolidated Fund Payments		0	329	363	0	1,275	1,252	0	1,397	1,324

Table A 1.6 Receipts and Payments Statement for the year ended 30 June 1987

Details	Note	Overseas Projects Program			Administrative Support Program			Non-Program Receipts and Payments			Total		
		1985/86		1986/87		1985/86		1986/87		1985/86		1986/87	
		Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate
Consolidated Fund		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Receipts													
Reimbursement of Costs:													
Livestock Marketing Reporting Service	17									128		66	
Fees—General	17									932		841	
Fees—Miscellaneous Services	17									1,916		1,686	
Dipping Fees										45		59	
Reimbursement—Administrative Costs										243		344	
Commonwealth Contributions:													
Plant Quarantine Service										3,011		3,138	
Commerce (Trade Descriptions) Act										1,184		1,234	
Overtime—Export & Import Services	17									330		77	
Animal Quarantine Services										922		1,038	
Animal Export Services										214		207	
Fisheries										395		402	
CSIRO Cotton Research										60		62	
Receipts for Services Rendered:													
Rents							7			165		185	
Students Fees										558		458	
Sale of Government Property							3			225		202	
Sales of Farm Produce	17									1,143		1,067	
Sales of Publications										145		117	
Fines and Forfeitures							2			6		23	
Fisheries & Oyster Farms Act	17									677		770	
Witness and Jurors Fees	17						70			4		70	
Collection of Premiums							33			29		33	
Interest							2			2		2	
Repayments to Credit of Vote, Previous Year										94		1	
Employer's Superannuation Contribution										764		677	
Apprenticeship Training Scheme							60			38		60	
Unclassified Receipts							15			51		42	
On-Costs for Officers on Loan	17						108			252		108	
Miscellaneous Receipts for Services Rendered				15			13			326		238	
Total Consolidated Fund Receipts		0	259	15	0	190	313	0	0	0	13,859	13,987	13,207
Payments													
Salaries and other employee payments	2		53	103		4,931	5,351			67,839	83,111	83,296	
Maintenance and working expenses	2		296	277		1,821	1,760			23,530	31,400	32,008	
Plant and equipment	2									353	1,286	1,381	
Grants and subsidies	2									2,659	2,707	2,764	
Other services	2					39	59			16,409	1,233	1,573	
Capital Works and Services						0	127			5,365	5,365	5,188	
Total Consolidated Fund Payments		0	349	380	0	6,791	7,297	0	0	0	116,155	125,102	126,210

Table A 2.1 Receipts and Payments Statement for the year ended 30 June 1987

Details	Note	Horticulture Program			Field Crops and Pastures Program			Plant Quarantine and Export Services Program		
		1985/86	1986/87		1985/86	1986/87		1985/86	1986/87	
		Actual	Estimate	Actual	Actual	Estimate	Actual	Actual	Estimate	Actual
Special Deposits Accounts		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Receipts										
Balance of Salaries				256			409			37
Consolidated Fund—Grant										
Commonwealth Grants										
Industry Fund Grants				215			2,728			
Working Accounts				435			337			107
Commonwealth Subsidy—Egg Marketing Board										
Employment Scheme Grants										
Sale of Equipment, Plant and other assets										
Interest on Investments										
Levies (Noxious Insects)										
Stamp Duty (Cattle Compensation Fund)										
Sale of Fisheries Licences										
Fees for Services Rendered							82			
Sale of Fish										
Refund of Overpayments										
Special Statutes Appropriation										
Collections										
Miscellaneous Receipts				47			56			
Total Special Deposits Receipts		0	0	963	0	0	3,815	0	0	144
Payments										
Salaries and other employee payments				230			2,379			
Maintenance and working expenses				516			1,709			47
Plant and equipment				63			540			
Grants and Subsidies										
Capital Works and Services										
Compensation Payments										
Other Services										
Total Special Deposits Payments		0	0	809	0	0	4,628			47
ALL FUNDS TOTAL RECEIPTS		0	402	1,267	0	413	4,507	0	5,339	5,054
TOTAL PAYMENTS		0	12,994	14,460	0	27,092	32,544	0	4,860	4,846
less Inter-fund transfers							1,410			
TOTAL—NET PROGRAM PAYMENTS		0	12,994	14,460	0	27,092	31,134	0	4,860	4,846

Table A 2.2 Receipts and Payments Statement for the year ended 30 June 1987

Details	Note	Extensive Animal Industries Program			Intensive Animal Industries Program			Animal Health Industries Program		
		1985/86		1986/87		1985/86		1986/87		
		Actual	Estimate	Actual	Actual	Estimate	Actual	Actual	Estimate	Actual
Special Deposits Accounts		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Receipts										
Balance of Salaries				186			26			274
Consolidated Fund—Grant										
Commonwealth Grants										
Industry Fund Grants				1,264			203			5
Working Accounts				1,054			281			782
Commonwealth Subsidy—Egg Marketing Board							2,644			
Employment Scheme Grants										
Sale of Equipment, Plant and other assets				24			1			462
Interest on Investments										
Levies (Noxious Insects)				1,197						
Stamp Duty (Cattle Compensation Fund)										167
Sale of Fisheries Licences										
Fees for Services Rendered										
Sale of Fish										
Refund of Overpayments										
Special Statutes Appropriation										
Collections										
Miscellaneous Receipts				23						1
Total Special Deposits Receipts		0	0	3,748	0	0	3,155	0	0	1,691
Payments										
Salaries and other employee payments				665			81			3,235
Maintenance and working expenses				1,413			3,186			1,366
Plant and equipment				130			24			165
Grants and Subsidies										
Capital Works and Services										
Compensation Payments										429
Other Services										
Total Special Deposits Payments		0	0	2,208	0	0	3,291	0	0	5,195
ALL FUNDS TOTAL RECEIPTS		0	2,610	5,767	0	542	3,494	0	2,177	3,831
TOTAL PAYMENTS		0	12,492	14,708	0	2,403	5,705	0	26,975	31,764
less Inter-Fund Transfers				15						4,544
TOTAL—NET PROGRAM PAYMENTS		0	12,492	14,693	0	2,403	5,705	0	26,975	27,220

Table A 2.3 Receipts and Payments Statement for the year ended 30 June 1987

Details	Note	Marine Fisheries—Regulation and Management Program			Marine Fisheries—Research and Development Program			Inland Fisheries—Regulation and Management Program		
		1985/86	1986/87		1985/86	1986/87		1985/86	1986/87	
		Actual	Estimate	Actual	Actual	Estimate	Actual	Actual	Estimate	Actual
Special Deposits Accounts		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Receipts										
Balance of Salaries				48						
Consolidated Fund—Grant										
Commonwealth Grants										
Industry Fund Grants							985			
Working Accounts				79			346			
Commonwealth Subsidy—Egg Marketing Board										
Employment Scheme Grants										
Sale of Equipment, Plant and other assets										
Interest on Investments										
Levies (Noxious Insects)										
Stamp Duty (Cattle Compensation Fund)										
Sale of Fisheries Licences										
Fees for Services Rendered										
Sale of Fish										
Refund of Overpayments										
Special Statutes Appropriation										
Collections							6			
Miscellaneous Receipts										
Total Special Deposits Receipts		0	0	127	0	0	1,337	0	0	0
Payments										
Salaries and other employee payments				9			2,613			
Maintenance and working expenses				83			1,543			
Plant and equipment							189			
Grants and Subsidies										
Capital Works and Services										
Compensation Payments										
Other Services										
Total Special Deposits Payments		0	0	92	0	0	4,345	0	0	0
ALL FUNDS TOTAL RECEIPTS		0	1,083	1,436	0	0	1,337	0	0	82
TOTAL PAYMENTS		0	4,207	4,465	0	4,522	8,342	0	725	821
less Inter-fund transfers							3,543			
TOTAL—NET PROGRAM PAYMENTS		0	4,207	4,465	0	4,522	4,799	0	725	821

Table A 2.4 Receipts and Payments Statement for the year ended 30 June 1987

Details	Note	Inland Fisheries—Research and Development Program			Technical Services Program			Education Program		
		1985/86	1986/87		1985/86	1986/87		1985/86	1986/87	
		Actual	Estimate	Actual	Actual	Estimate	Actual	Actual	Estimate	Actual
Special Deposits Accounts		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Receipts										
Balance of Salaries							141			63
Consolidated Fund—Grant										
Commonwealth Grants										
Industry Fund Grants							32			
Working Accounts				8			22			179
Commonwealth Subsidy—Egg Marketing Board										
Employment Scheme Grants										
Sale of Equipment, Plant and other assets				131			44			
Interest on Investments										
Levies (Noxious Insects)										
Stamp Duty (Cattle Compensation Fund)										
Sale of Fisheries Licences				1,063						
Fees for Services Rendered										
Sale of Fish				25						
Refund of Overpayments										
Special Statutes Appropriation										
Collections				32						
Miscellaneous Receipts				15			2			
Total Special Deposits Receipts		0	0	1,274	0	0	241	0	0	242
Payments										
Salaries and other employee payments				1,985			29			32
Maintenance and working expenses				1,326			113			152
Plant and equipment				249			1			
Grants and Subsidies										
Capital Works and Services										
Compensation Payments										
Other Services				17						
Total Special Deposits Payments		0	0	3,577	0	0	143	0	0	184
ALL FUNDS TOTAL RECEIPTS		0	0	1,340	0	209	493	0	607	942
TOTAL PAYMENTS		0	1,642	5,207	0	12,412	12,563	0	4,637	4,688
less Inter-fund transfers				2,308						
TOTAL—NET PROGRAM PAYMENTS		0	1,642	2,899	0	12,412	12,563	0	4,637	4,688

Table A 2.5 Receipts and Payments Statement for the year ended 30 June 1987

Details	Note	Agricultural Services Grant Program			Marketing Services Program			Economic Services Program		
		1985/86	1986/87		1985/86	1986/87		1985/86	1986/87	
		Actual	Estimate	Actual	Actual	Estimate	Actual	Actual	Estimate	Actual
Special Deposits Accounts		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Receipts										
Balance of Salaries				1			13			18
Consolidated Fund—Grant										
Commonwealth Grants										
Industry Fund Grants										
Working Accounts										
Commonwealth Subsidy—Egg										
Marketing Board										
Employment Scheme Grants										
Sale of Equipment, Plant and other										
assets										
Interest on Investments										
Levies (Noxious Insects)										
Stamp Duty (Cattle Compensation										
Fund)										
Sale of Fisheries Licences										
Fees for Services Rendered										
Sale of Fish										
Refund of Overpayments										
Special Statutes Appropriation										
Collections										
Miscellaneous Receipts										
Total Special Deposits Receipts		0	0	1	0	0	13	0	0	18
Payments										
Salaries and other employee payments										
Maintenance and working expenses										18
Plant and equipment										4
Grants and Subsidies										
Capital Works and Services										
Compensation Payments										
Other Services										
Total Special Deposits Payments		0	0	0	0	0	0	0	0	22
ALL FUNDS TOTAL RECEIPTS		0	0	1	0	156	79	0	0	18
TOTAL PAYMENTS		0	329	363	0	1,275	1,252	0	1,397	1,346
less Inter-fund transfers										
TOTAL—NET PROGRAM		0	329	363	0	1,275	1,252	0	1,397	1,346
PAYMENTS										

Table A 2.6 Receipts and Payments Statement for the year ended 30 June 1987

Details	Note	Overseas Projects Program			Administrative Support Program			Non-Program Receipts and Payments			Total		
		1985/86		1986/87		1985/86		1986/87		1985/86		1986/87	
		Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate
Special Deposits Accounts		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Receipts													
Balance of Salaries				1			119			718		1,592	
Consolidated Fund—Grant	17									7,929		0	
Commonwealth Grants	17	--								5,153		0	
Industry Fund Grants	17									4,405		5,432	
Working Accounts	17			767			490			4,022		4,887	
Commonwealth Subsidy—Egg Marketing Board	17									4,971		2,644	
Employment Scheme Grants	17									3,728	9,604	3,728	
Sale of Equipment, Plant and other assets											899	875	
Interest on Investments	17										417	0	
Levies (Noxious Insects)										1,304		1,197	
Stamp Duty (Cattle Compensation Fund)										164		167	
Sale of Fisheries Licences										1,175		1,063	
Fees for Services Rendered										118		82	
Sale of Fish										18		25	
Refund of Overpayments										6		0	
Special Statutes Appropriation	17									60		0	
Collections										0		38	
Miscellaneous Receipts										245		144	
Total Special Deposits Receipts		0	0	768	0	0	609	0	0	3,728	41,208	0	21,874
Payments													
Salaries and other employee payments	17			328						5,330	23,517	16,916	
Maintenance and working expenses	17			272			424			1,922	10,832	14,090	
Plant and equipment											1,815	1,365	
Grants and Subsidies	17									1,096		0	
Capital Works and Services										39		0	
Compensation Payments										314		429	
Other Services	17									421		17	
Balance of Salaries										718	528	718	
Total Special Deposits Payments		0	0	600	0	0	424	0	0	7,970	38,562	0	33,535
ALL FUNDS TOTAL RECEIPTS		0	259	783	0	190	922	0	0	3,728	55,067	13,987	35,081
TOTAL PAYMENTS		0	349	980	0	6,791	7,721	0	0	7,970	154,717	125,102	159,745
less Inter-fund transfers													11,820
TOTAL—NET PROGRAM PAYMENTS		0	349	980	0	6,791	7,721	0	0	7,970	154,717	125,102	147,925

Table B Summarised Receipts and Payments Statement for the Special Deposits Accounts by Item for the Year Ended 30 June 1987

Details	Note	1985/86		1986/87	
		Actual	Estimate	Actual	
		\$'000	\$'000	\$'000	
RECEIPTS					
Receipts for Services Rendered					
Rents and Students Fees		723	0	654	
Fees					
General	17	961	0	923	
Miscellaneous Services	17	2,308	0	1,815	
Receipts Fisheries and Oyster Farms Act	17	677	0	770	
Commonwealth Contributions:					
Plant Quarantine Services		3,011	0	3,138	
Commerce (Trade Descriptions) Act	17	1,184	0	1,234	
Overtime (Export and Import Branch)	17	330	0	77	
CSIRO Cotton Research		60	0	62	
Animal Quarantine Services		922	0	1,038	
Animal Export Services		214	0	207	
Commonwealth Fisheries		395	0	402	
		6,116	0	6,158	
Grants and Subsidies:					
Consolidated Grants	2 a	7,929	0	0	
Commonwealth Grants	2 b	5,153	0	0	
Employment Schemes	17	9,604	0	3,728	
Industry Funds	17	4,405	0	5,432	
Working Accounts	17	4,022	0	4,887	
Commonwealth Subsidy—Egg Marketing Board	17	4,971	0	2,644	
		36,084	0	16,691	
Special Statutes Appropriation		60	0	0	
Miscellaneous					
Sale of Farm Produce	17	1,143	0	1,092	
Sale of Government Property		225	0	202	
Sale of Publications		145	0	117	
Repayment of Credit to Previous Years Vote		94	0	1	
Employer's Superannuation Contributions		764	0	677	
On-Costs for Officers on Loan	17	252	0	108	
Apprenticeship Training Scheme		38	0	60	
Miscellaneous Receipts		238	0	446	
Fines and Forfeitures		6	0	23	
Reimbursement of Administrative Costs		243	0	344	
Reimbursement of Cost:					
Livestock Marketing Reporting Services	17	128	0	66	
Levies (Noxious Insects Destruction Account)		1,304	0	1,197	
Sale of Assets		899	0	875	
Sale of Fisheries Licences		1,175	0	1,063	
Prickly Pear Control Work		89	0	0	
Interest	17	417	0	2	
Stamp Duty (Cattle Compensation Fund)		164	0	167	
Collections		96	0	38	
Sub-total	1 g	54,349	13,987	33,489	
Balance of Salaries		718	0	1,592	
TOTAL—RECEIPTS	1 h	55,067	13,987	35,081	
PAYMENTS					
Salaries and other employee payments:					
Salaries, Wages and Allowances		64,667	80,617	96,084	
Payments for Leave on Retirement, Resignation		2,757	1,492	2,897	
Special Deposits Accounts	1 h	23,517	0	0	
Inter-Fund Transfers		0	0	—7,424	
TOTAL SALARIES AND OTHER EMPLOYEES PAYMENTS	1 g	91,356	83,111	92,788	
Maintenance and Working Expenses					
Subsidiary Staff Charges					
Workers Compensation Insurance		1,374	0	2,189	
Meal Allowances		16	0	68	
Payroll Tax		397	0	1,496	
Employers Contribution to Superannuation Schemes		170	0	832	
Fringe Benefits Tax		0	0	243	
Long Service Leave		0	0	103	
Expenses in Connection with Buildings					
Rent		500	0	1,002	
Payments of Rates, Charges etc		278	0	406	
Cleaning		53	0	84	
Maintenance, Alterations, Additions and Renewals		1,262	0	1,958	
Subsistence and Transport Expenses					
Travelling Removal and Subsistence Expenses		3,447	0	4,479	
Motor Vehicles—Running Costs, Maintenance, Hire and Insurance		2,083	0	2,993	
Marine Craft—Running Costs		0	0	465	
Freight, Cartage and Packing		179	0	270	

Table B (continued)

Details	Note	1985/86	1986/87	
		Actual	Estimate	Actual
PAYMENTS (continued)		\$'000	\$'000	\$'000
General Expenses				
Advertising and Publicity		82	0	152
Postal and Telephone Expenses		2,636	0	3,064
Fees for Services Rendered		1,672	0	3,080
Stores, Provisions, Furniture, Equipment, Minor Plant etc. (including Maintenance, Repairs)		6,025	0	14,642
Printing and Stationery		1,153	0	1,101
Gas and Electricity		1,818	0	2,105
Laundry Expenses		17	0	23
Other Insurances		0	0	25
Minor Expenses (not elsewhere included)		11	0	35
Payments—General*		0	0	4,658
Cattle Compensation—Payments*		0	0	429
Special Deposits Accounts*	1 h	10,832	0	0
Inter-Fund Transfers		0	0	—3,745
TOTAL MAINTENANCE AND WORKING EXPENSES	1 g	34,362	31,400	42,782
Plant and Equipment				
Purchase of Motor Vehicles		150	509	1064
Other Plant and Equipment		78	519	1372
Purchase of Marine Craft		80	212	264
Purchase of Equipment for Fisheries Inspectors		45	46	46
Special Deposits Accounts	1 h	1,815	0	0
Inter-Fund Transfers		0	0	—618
TOTAL PLANT AND EQUIPMENT	1 g	2,168	1,286	2,128
Grants and Subsidies				
Organisation of Agricultural Bureau & Branches		1	2	1
District Exhibits at Royal Agricultural Society Show		50	50	50
Australian Journal of Experimental Agriculture and Animal Husbandry		27	27	27
Agriculture Societies Council of NSW		1	1	1
C.B. Alexander Foundation		5	5	5
Rural Youth Organisation of NSW		10	10	5
Commonwealth Agricultural Bureaux		7	33	59
Destruction of Noxious Weeds		2,500	2,500	2,500
Tobacco Research		5	5	5
Pastures Protection Boards		10	29	38
Dingo Destruction Boards		43	45	58
Rural Counsellors—Contribution			0	15
Special Deposits Accounts	1 h	1,096	0	0
TOTAL GRANTS AND SUBSIDIES	1 g	3,755	2,707	2,764
Other Services				
Overseas Visits		135	39	59
NSW Institute of Rural Studies—Expenses		3	6	5
Livestock Market Reporting Service		106	0	0
'Total Homestead' Maintenance		25	25	25
Management of Australian Bibliography of Agriculture		16	18	17
Contribution toward Expenses of Visiting Overseas Specialists		10	12	8
NSW Meat Industry Authority		250	0	0
Maintenance and Allocation of Travelling Stock Routes		40	97	17
Homebush Abattoir Corporation Review Expenses		92	0	0
Expenses in Connection with Food Preserving Problems		83	90	90
Fruit Fly Suppression Program—Expenses		35	35	35
Plant Quarantine Publicity Campaign—State's Share of Cost		36	40	36
Contribution towards Investigations into Commodity Treatment of Fresh Fruits		19	33	20
Contribution towards Repositories for Virus-tested Fruit Varieties		21	22	22
Eradication Campaign—Green Snail (<i>Helix aspersa</i>)		11	11	11
Noxious Plants Advisory Committee		25	26	26
Supplementation of Prickly Pear Destruction Fund		1,317	0	0
Commerce (Trade Descriptions) Act—Expenses		1,392	0	0
Plant Quarantine—Expenses		2,936	0	0
Biological Control of <i>Salvinia</i> Weed		38	0	0
Agricultural Scientific Collections Trust		14	15	15
Repairs to Roads		63	78	78
State Grant (T.E.A.) Act—Expenses		107	119	118
Control of Legume Inoculant Quality in Australia—State's Share		15	15	14
NSW—China Cooperative Agricultural Projects		188	0	0
Guayule Research Project		38	0	0
Compensation to Beekeepers		24	19	22
Tuberculosis and Brucellosis Eradication Campaign—Amount to be Transferred to Special Deposits Account		2,114	0	0

* Previously accounted for under Special Deposits Accounts

Table B (continued)

Details	Note	1985/86	1986/87	
		Actual	Estimate	Actual
PAYMENTS (continued)		\$'000	\$'000	\$'000
Eradication of Rabbits and Feral Pigs on Unoccupied Crown Lands		13	13	12
Chicken Meat Industry Committee—Expenses		19	18	12
Exotic Disease Feral Animal Control Study		20	55	83
Dairy Herd Improvement Centre—Expenses		647	0	0
Veterinary Surgeons' Board—Expenses		85	0	0
Animal Quarantine—Expenses		840	0	0
Animal Export—Expenses		209	0	0
Avian Influenza (Fowl Plague) Outbreak—Victoria, May 1985		482	0	0
Compensation (Cattle Tick Control)		0	1	0
Fencing and Other Facilities		150	49	49
Cattle Tick Research		54	52	52
Commercial Fisheries Exploration and Development Fund—Contribution		2,659	0	0
NSW Amateur Fishermen's Advisory Council Expenses		8	12	13
Inland Fisheries Fund—Contribution		1,624	0	0
Meshing of Sharks		229	238	257
Purchase of Oyster Lease Signs		7	14	11
Tidal Angling Fund—Contribution		210	0	0
Payment of Court Costs awarded against the Department		1	0	0
Eradication of Potato Cyst Nematode		0	0	11
Diseased Strawberry Plants		0	0	375
Contribution to Danish Seine Research		0	81	81
Repayment of Treasury Loan		0	0	16
Special Deposits Accounts	1 h	774	0	0
Inter-Fund Transfers		0	0	-33
	1 g	17,184	1,233	1,557
Balance of Salaries		528	0	718
TOTAL PAYMENTS		149,353	119,737	142,737
Capital Works and Services				
Yanco Agricultural Institute—				
Stage 1—Short Course Centre		—5	0	0
Stage 2—Advisory Complex		264	8	5
Gaden Trout Hatchery, Jindabyne—				
Water supply		46	0	0
Tourist Facilities		207	0	0
Dutton Trout Hatchery, Ebor—Tourist Facilities		389	147	138
Office/Laboratory Extensions—Gosford		979	25	38
John Macarthur Institute—Camden Park		277	700	676
Oyster Hatchery—Port Stephens		187	926	373
Biological & Chemical Research Institute—				
Re-roofing Blocks A,B,& C		324	0	0
Fire Hazard Prevention		518	780	1,154
Agricultural Research Centre, Tamworth—				
Extensions		155	5	12
Advisory Office Accommodation		89	0	0
Replacement Cottage—Alstonville		65	8	10
Boatshed and Facilities		1	75	104
Office and Boatshed, Merimbula		1	95	95
Incinerator—Armidale		68	0	0
Agricultural Research Centre, Trangie—Laboratory Extensions		0	65	74
Temora and Deniliquin—Outreach Centre		0	411	216
C.B. Alexander, Tocai—Extensions		0	0	10
Purchase of Cottage—Woy Woy		0	0	80
Advisory Officers & Prickly Pear Commission—Accommodation, Mudgee		0	120	123
Purchase of Land—Deniliquin		0	0	80
Acquisition of Plant and Equipment, and Maintenance (Roads and Cottages)		1,800	2,000	2,000
		5,365	5,365	5,188

Table C Statement of Special Deposit Account Balances as at 30 June 1987

Previous Year			Account	Note	1986/87		
Cash \$000	Securities \$000	Total \$000			Cash \$000	Securities \$000	Total \$000
6,785	0	6,785	Sundry Deposits				
			Treasury Account No.0642		4,356	0	4,356
			Tuberculosis and Brucellosis Eradication Campaign Working Account				
198	0	198	Treasury Account No.0643		936	0	936
			Australian Extension Services Grant				
121	0	121	Treasury Account No.0710		71	0	71
			Special Drought Fodder Relief Scheme				
7	0	7	Treasury Account No.0893		0	0	0
			Cattle Compensation Fund				
4,498	0	4,498	Treasury Account No.1404		4,468	0	4,468
			Inland Fisheries Fund				
8	0	8	Treasury Account No.1426		11	0	11
			Noxious Insects Destruction Account				
1,041	0	1,041	Treasury Account No.1433		1,764	0	1,764
			Prickly Pear Destruction Working Account				
7	0	7	Treasury Account No.1437		121	0	121
			Swine Compensation Fund				
(124)	1,550	1,426	Treasury Account No.1446		108	1,550	1,658
			Commercial Fisheries Exploration and Development Fund				
9	0	9	Treasury Account No.1602		274	0	274
			Tidal Angling Fund				
5	0	5	Treasury Account No.1669		1	0	1
			Tobacco Industry Trust				
8	0	8	Treasury Account No.1670		1	0	1
			Water Hyacinth Control Campaign Working Account				
21	0	21	Treasury Account No.1698		0	0	0
			Wheat Industry Stabilisation Fund				
6	0	6	Treasury Account No.1701		4	0	4
			Commonwealth Fisheries Act				
35	0	35	Treasury Account No.1749		28	0	28
			Wheat Industry Stabilisation Investment Fund				
0	34	34	Treasury Account No.2113		0	0	0
			Treasury Fire Risk Account				
(68)	0	(68)	Treasury Account No.1449		(196)	0	(196)
			Balance of Salaries—Adjustment				
718	0	718	Treasury Account No.1140		1,592	0	1,592
			Unclaimed Moneys Account				
27	0	27	Treasury Account No.1951		16	0	16
			Motor Vehicle Advances				
(29)	0	(29)	Treasury Account No.602		(5)	0	(5)
			Advances to be Recovered—Salary Payments				
(3)	0	(3)	Treasury Account No.1121		0	0	0
			Advance to be Recovered—Bega Dairy Demonstration Farm				
(7)	0	(7)	Treasury Account No.1108		(6)	0	(6)
			Special Schemes to Promote Youth Employment and Employment Generally				
(191)	0	(191)	Treasury Account No.1662		(191)	0	(191)
13,072	1,584	14,656	TOTAL SPECIAL DEPOSITS		13,353	1,550	14,903

Appendix 1. Stores and equipment purchases

Monthly expenditure on stores and equipment purchases during 1986-87 was as follows:

1986	\$
July	320,774
August	435,335
September	660,586
October	666,364
November	1,677,898
December	2,430,379

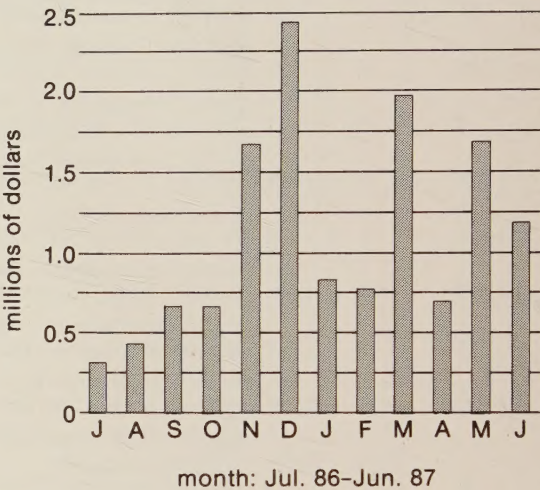
1987	\$
January	830,568
February	763,878
March	1,989,879
April	691,174
May	1,695,043
June	1,186,467

The following information should be considered when examining the above expenditure:

- Spending during the early months was low while staff within the Department became familiarised with the computerised accounting system.

- Spending during April 1987 was low because computers at two regional headquarters experienced software problems and were inoperative for several weeks. Expenditure during May and June 1987 offsets the reduced spending during April 1987.

A graphical presentation of monthly spending is shown below.



Appendix 2. Late submission of the Annual Report for 1986-87

Public Finance and Audit Act Section 45H(3)

On 10 August 1987 the Department sought an extension of time for submission of its financial statements. A one-month extension was granted by the Treasurer on 30 September 1987.

Financial statements were submitted to the Auditor-General's Department on 14 September 1987, within the extension of time granted.

Then, on 23 October, the Department sought a two-month extension of time for submission of the printed report to the Minister. The Treasurer, on 18

November 1987, granted a one-month extension for submission of the report—that is, to 30 November 1987.

Continued problems in meeting auditing requirements, and the need to recast the financial statements in a new format in late November 1987, made it impossible to submit the completed report within the new time limit.

The Auditor-General's Certificate to the financial statements was signed on 11 January 1988.

